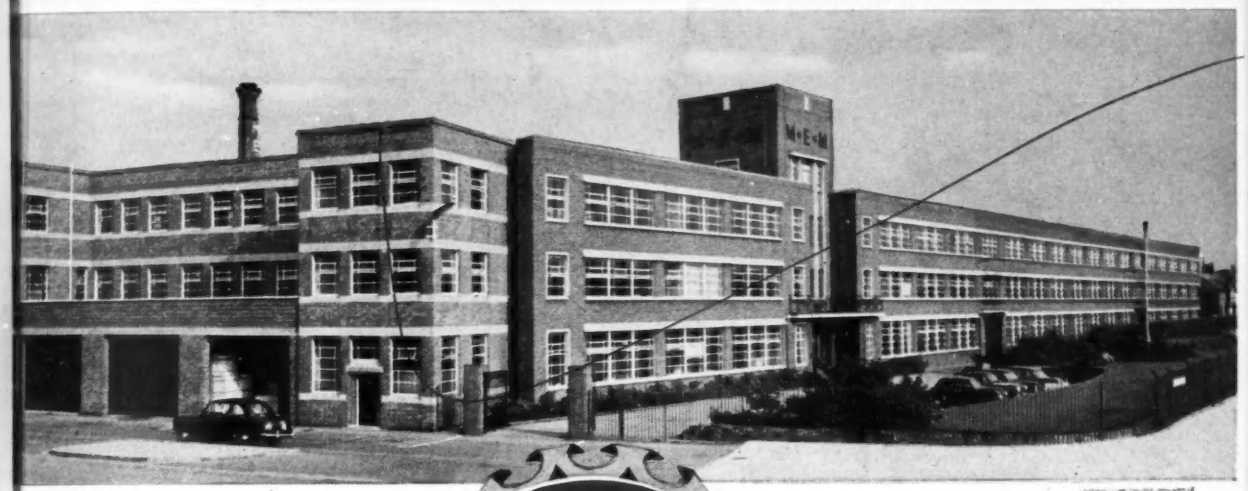
ELECTRICAL REVIEW

FRIDAY
OCTOBER 1958

WEEKLY
PRICE 1s 6d



MEM

CELEBRATE THEIR 50TH ANNIVERSARY

Even one of the most forward-looking organisations in a forward-looking industry can look back for once when it reaches its 50th anniversary. Over the past half century two big developments have made challenges to MEM — the almost universal electrification of Britain's homes and factories, and the individual motorisation of industrial machinery. Whatever the next 50 years may offer MEM is already preparing to meet these new challenges.

1908-1958

MIDLAND ELECTRIC MANUFACTURING CO. LTD · TYSELEY · BIRMINGHAM 11

We of The Benjamin Electric Ltd., are proud of our long association with the Electrical Industry and we offer our grateful thanks for all the help and encouragement received during the past fifty years. To our customers we are equally indebted for their co-operation during the same period. It is the aim and desire of our world-wide organisation on this, our Golden Jubilee, to maintain and strengthen in future years the prestige of the industry of which we are part.

better lighting by BENJAMIN REGD.

THE BENJAMIN ELECTRIC LIMITED · TOTTENHAM · LONDON N.17

TEL: TOTTENHAM 5252 (5 LINES) GRAMS: (BENJALECT · SOUTHTOT · LONDON)

BIRMINGHAM: *5 Corporation Street, Birmingham 2. Tel. Midland 5197* · LEEDS: *49 Basinghall Street, Leeds. Tel. Leeds 25579*

BRISTOL: *Royal London Buildings, Baldwin Street, Bristol. Tel. Bristol 28406*

Simpe's 178

Photograph by courtesy of British Insulated Callenders' Cables, Ltd.

AVO in action..

The checking of a busbar installation in a large steel works is an interesting example of the important contribution of the world-famous AvoMeter to the maintenance of electrical power plant. AvoMeters will be found wherever electricity is used in industry.

Model 40 Universal AVOMETER

A self-contained multi-range A.C./D.C. instrument providing 40 ranges of direct readings of current, voltage and resistance on a 5-inch hand calibrated scale fitted with an anti-parallax mirror. Range selection is by two rotary switches, for A.C. and D.C. respectively, and a press button provides additional ranges by halving the current and voltage ranges shown on the switch knobs. The total resistance of the meter is 200,000 ohms.

The instrument is compact and portable, and is protected by an automatic cut-out against damage through the inadvertent application of overload.

Power Factor and reactive kV.A. can be measured in A.C. circuits by means of an external accessory (the Universal AvoMeter Power Factor & Wattage Unit).

Size: 8 × 7½ × 4½ ins.
Weight: 6¼ lbs.

List Price **£19 : 10s.**

...you can depend on AVO

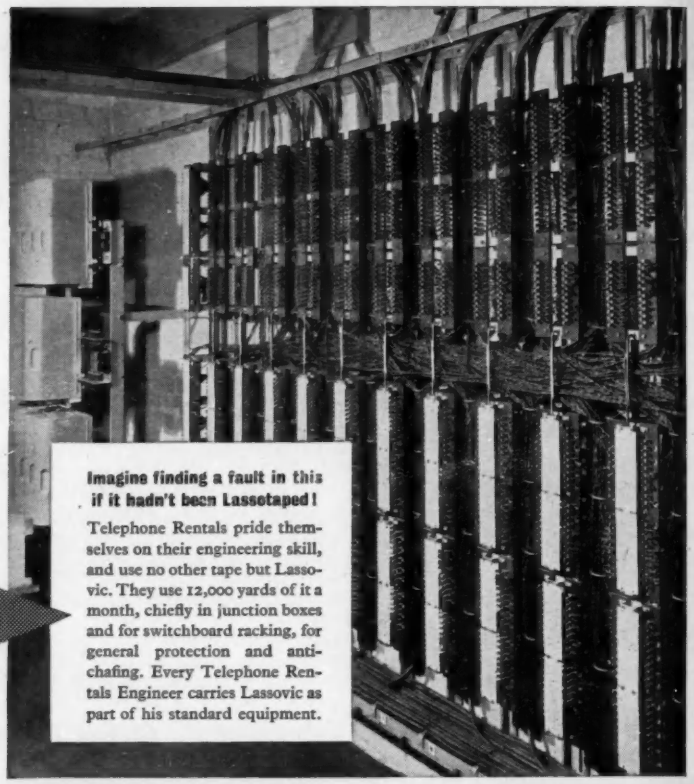
Sole Proprietors and Manufacturers :—

AVO LTD

AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1. *Telephone: VICtoria 3404 (9 lines)*

A 40/3

This is why TELEPHONE RENTALS



Imagine finding a fault in this if it hadn't been Lassotaped!

Telephone Rentals pride themselves on their engineering skill, and use no other tape but Lassovic. They use 12,000 yards of it a month, chiefly in junction boxes and for switchboard racking, for general protection and anti-chafing. Every Telephone Rentals Engineer carries Lassovic as part of his standard equipment.

and MURPHY RADIO

Corrosion is the danger: Lassothene is the answer

Any material that Murphy uses has to pass rigorous type approval tests in their Engineering Dept. They gave Lassothene good marks for high dielectric strength, low water absorption, and chemical purity. Here are components for a portable radio, and TV sets.

always rely on LASSOTAPES

Advice and information free at any time from

TECHNICAL TAPES DIVISION, H26 SMITH & NEPHEW LTD., WELWYN GARDEN CITY, HERTS

BLOW! we should have fitted Brush H.B.C. Fuses

What makes you say that?

They're tested to B.S. 88 1952—with complete ASTA certification—and Brush test their complete range. Their fuses are absolutely reliable. They operate *fast* when a fault occurs. They give your equipment first-class, dependable protection.

They are completely interchangeable and will fit all reputable makes of switch-fuses. More than that—Brush make them in a full range of current ratings from 2 to 800 amps, in eleven body sizes. End tags can be varied to meet customers' special requirements.

What about delivery?

Brush are offering delivery from stock over most of the range. And even where delivery cannot be immediate, it is positively short.

Right! Let's order from Brush right away and save ourselves trouble in the future.

for H.B.C. FUSE LINKS see BRUSH

Used extensively by government departments and by industries throughout the world

Write for combined descriptive booklet and price list No. 41052/*AD*

BRUSH ELECTRICAL ENGINEERING CO LTD • LOUGHBOROUGH • ENGLAND

A Member of the Hawker Siddeley Group

F.1

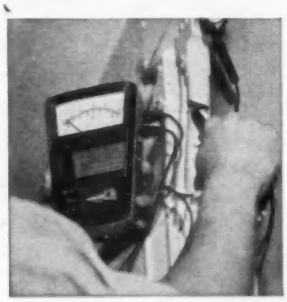
Meet the New METROHM

INSULATION AND CONTINUITY TESTER

TRANSISTORISED!

PRINTED CIRCUIT!

ONE-HAND OPERATION!



It's the most significant advance in insulation and earth continuity testers for years.
Really thoughtful planning and design give the METROHM many important advantages.
Here are some:

1. Transistorised for high conversion efficiency.
2. Printed circuit for extra reliability.
3. Easy one-hand operation.
4. Clear-reading protected dial.
5. Moulded front panel set in a fibre-glass case.
   250 and 100 volt models also available.
   For fuller technical description and applications write for Sheet 242 A.
6. 500-volt insulation and continuity tests combined in a single instrument.
7. Practically ripple-free — only 0.1% ripple.
8. Long battery-life.
9. Good design and quantity production combine to keep the price low.

PRICE: *complete with detachable polythene front cover, leather sling strap and 5′ test leads fitted with crocodile prod clips* **£21.12.0d.**

EVERETT EDGCUMBE & CO. LTD.

COLINDALE WORKS, LONDON, N.W.9
Telephone: COLINDALE 6045
LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, W.C.2

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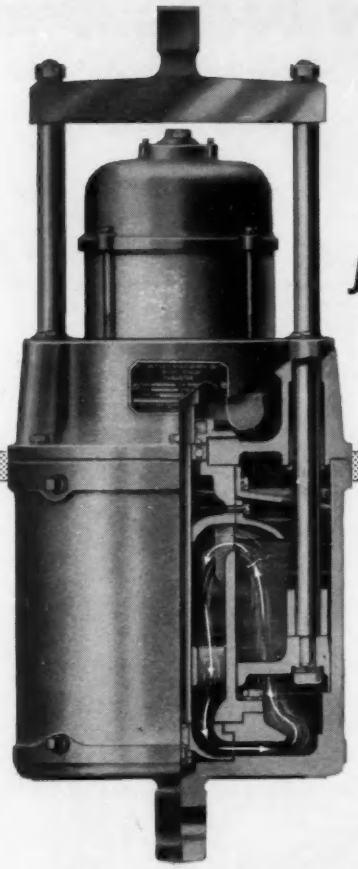
B T-H

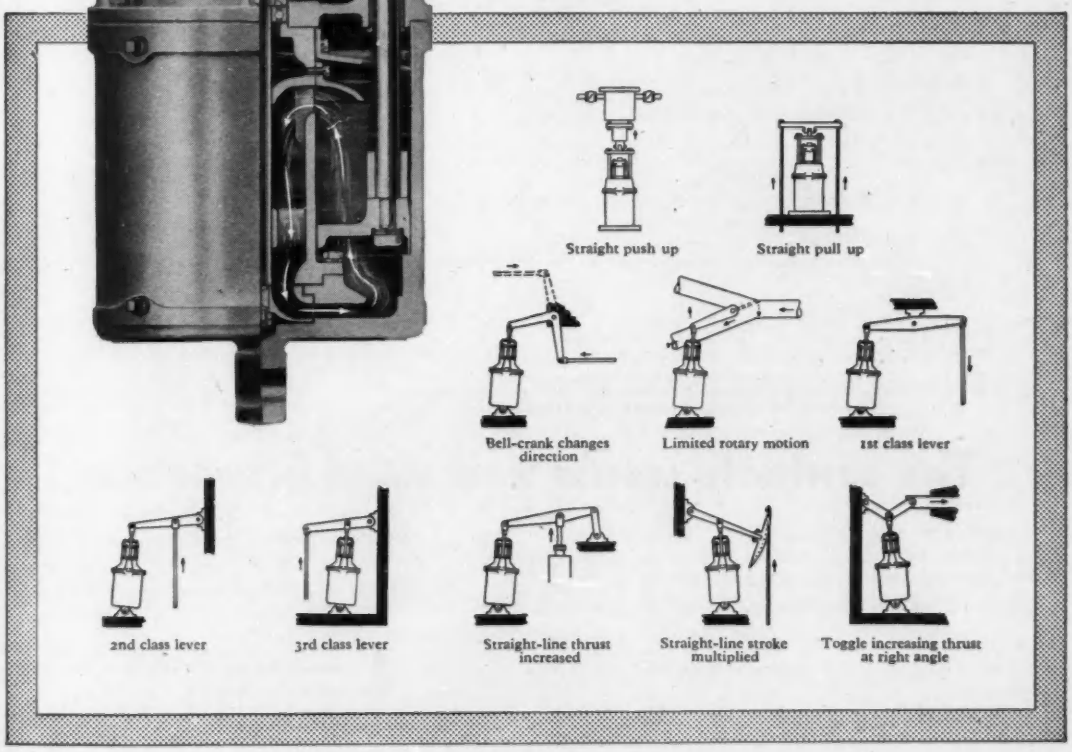
Electro-Hydraulic Thrustors



Smooth straight-line constant-pressure thrust from start to finish of stroke.
From 40-lb. thrust, 2-in. stroke to 800-lb. thrust, 12-in. stroke.

Just switch on—

the thrustor does the work



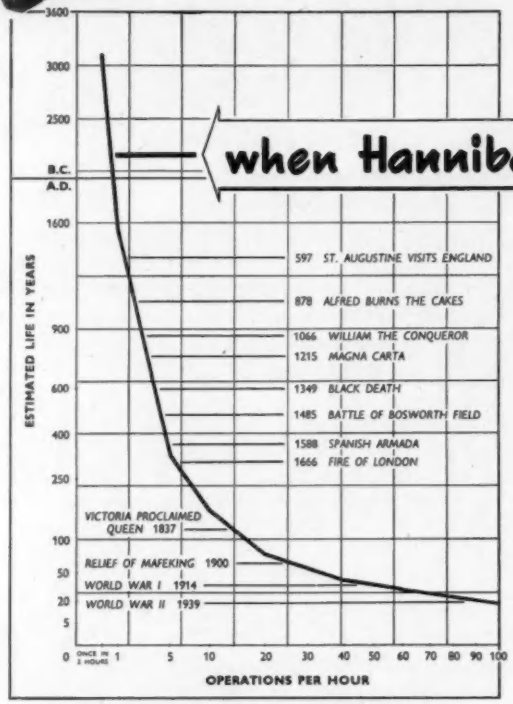
BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED • RUGBY • ENGLAND

Member of the AEI group of companies

A4888

if this CRABTREE starter could have been installed



GRAPH SHOWING TIME TAKEN IN YEARS RELATED TO 4,100,000 OPERATIONS PERFORMED BY CRABTREE TYPE B-15 CONTACTOR (BASED ON A 50-HOUR WEEK AND A 52-WEEK YEAR)

when Hannibal crossed the Alps

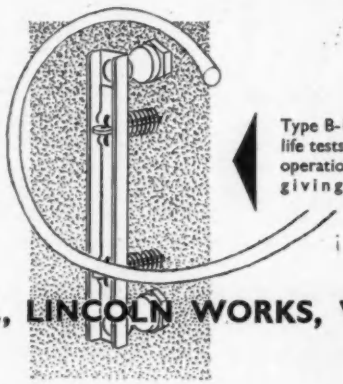
The contacts would now need inspection

Tests are now proceeding in which Crabtree Type B-15 starters are being used for repeatedly stopping and starting motors. To date, the starters have given the following operations (start and stop) without change of contacts

(a) Controlling a 5 h.p. motor : 4,500,000 operations ;

(b) Controlling a 1 h.p. motor : 4,500,000 operations.

These tests are continuing.



Type B-15 contacts, on actual motor-load life tests, have already achieved 4,500,000 operations (start and stop) and are still giving satisfactory service.

J. A. CRABTREE & CO. LTD., LINCOLN WORKS, WALSALL, STAFFS.

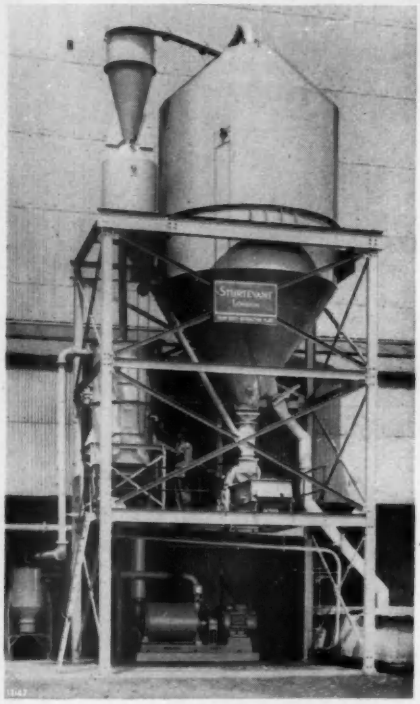
C780

STURTEVANT

FLUE DUST EXTRACTION PLANT

for the

CONTINUOUS extraction of flue dust and grit from boiler hoppers whilst under steaming conditions



This illustration shows a plant for six stoker-fired boilers for process steam at a large paper mill. Dust and grit from the hoppers are collected at the rate of about four tons per hour. Plant includes a Sturtevant Turbo-Exhauster and Receiver with dust conditioner to prevent dust escaping to atmosphere when discharging into a disposal lorry.

- **Eliminates manhandling of dust and grit.**
- **Gives cleaner conditions in the boiler house.**
- **Conveys dust and grit direct from boiler hoppers to central receiver.**

With the addition of a small bore piping system complete vacuum cleaning of all surfaces can be carried out from hose connections placed at convenient points.

Particulars may be obtained by writing to reference U/101/CWB.

STURTEVANT ENGINEERING CO. LTD.
Southern House, Cannon Street, London, E.C.4

AUSTRALIA
STURTEVANT ENGINEERING CO. (AUSTRALASIA) LTD. 400, SUSSEX STREET, SYDNEY, N.S.W.

'TWO-IN-ONE' BELL

Bell and Buzzer in the same unit. Operated by two pushes direct from A.C. mains through a small transformer. Gong finished nickel-plate and lacquered.

Fig. 382 3" Transformer working (5-8v. 50 cycles) 13/4

'ALL-IN-ONE' BELL

An ideal domestic Bell carrying its own battery under snap-on bakelite cover. No loose batteries or trailing wires. A push and a short length of wire and the Bell can be installed in a few moments. Large accessible terminals. Protected wire entries. Bell movement is housed under 3" Gong as in our 396 series. Fully tested. Flat pocket torch battery gives an average of one year's working without renewal. Gong finished nickel plate and lacquered.

Fig. 398 (excluding batteries) 11/8
Packed individually in attractive cartons.

It's *Quality* that sells these –

'UNDERDOME' BELL

Available with nickel-plate and lacquered Dome gong in 3" and 4" diam. sizes and with 3" diam. bright nickel-plated Church gong* Supplied in the following voltages:

Fig. 396 3" A.C./D.C.	3-4½v.	7/8
	12v.	8/10
	24v.	10/4
Fig. 392 3" A.C.	4-6v.	7/-
*Extra for 3" Church gong		2/4
Fig. 396 4" D.C.	4½-6v.	16/-
Fig. 396 4" A.C.	8v.	16/-

'NEATABELL' ALL-IN-ONE BATTERY BELL

An ideal domestic bell having its own batteries and 3" deep section bell under a specially designed cover which acts as an amplifier. Both base and cover are made of white resilient shatter-proof plastic. Uses two Ever Ready batteries No. U11 or equal. Easily installed in a few moments by wiring push to two terminals at back. Fitted with T.V. suppressor. Gong finished nickel-plate and lacquered.

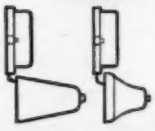
Fig. 400 (excluding batteries) 12/8
Packed individually in attractive cartons.

BELLS!

BAKELITE CASED BELL

Available with 3" diam. nickel-plate and lacquered Dome gong, 3" diam. bright nickel-plated Church gong or bright nickel-plated Sheep gong.* Supplied in the following voltages:—

Fig. 391 Battery working (D.C.)		
	3-4½v.	10/4
	6v.	13/-
	12v.	13/-
	24v.	14/6
Fig. 391 Transformer working (50 cycles A.C.)		
	3-4½v.	10/4
	8v.	10/2
	12v.	10/2
	24v.	11/8
*Extra for Church gong		2/4
*Extra for Sheep gong		3/8



MINIATURE DUOTONE BUZZER

Highly efficient buzzer in cream coloured moulded plastic case. Can be operated on D.C. (3-4½v. Battery) as a high frequency buzzer, or on A.C. (8v. Transformer tapping) as a medium pitched buzzer. Also available as a PSV model for 24v. D.C.

Fig. 384 3-4½v. D.C. and 8v. A.C. 7/6
Fig. 384 PSV model 24v. D.C. only 10/9

Sell, specify and install . . .

GENTS' OF LEICESTER **ELECTRIC BELLS & BUZZERS**

GENT & COMPANY LIMITED . FARADAY WORKS . LEICESTER

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BUZZERS

Fitted in moulded bakelite case with "snap-on" cover, or with metal cover and T.V. suppressor for transport patterns (suffix TM below).

Fig. 399	3-4½v. A.C./D.C.	8/6
Fig. 399 TM/A	12v. D.C.	15/-
Fig. 399 TM/B	24v. D.C.	15/-
Fig. 399 TM/C	36v. D.C.	15/-
Fig. 383/A	3-5v. A.C. 50 cycles	7/8
Fig. 383/B	6-8v. A.C. 50 cycles	8/4
Fig. 383/C	10-12v. A.C. 50 cycles	10/1
Fig. 383/D	20-24v. A.C. 50 cycles	11/10

BELL TRANSFORMER

Suitable for Bells and Domestic Chimes. Enclosed in neat sheet steel cover stove-enamelled cream with black plastic base. Fully interleaved windings vacuum impregnated with thermoplastic compound. Guarded terminals totally enclosed by cover. Fused secondary. Output 2 amps. Dimensions: 3⅛" x 3⅛" x 2" deep.

	Primary	Secondary	
Fig. 1139	200-250v.	4-8-12v.	19/4

Packed individually in attractive cartons.

Other Products include : Fire & Burglar Alarms Indicators Staff Locators Synchronous Mains Clocks Controlled Electric Clock Systems Time Recorders . Etc.

TAKE MY TIP

USE GOOD CONTROL GEAR

Motors and machines need careful handling .... with reliable control of their operations. Efficient starters give easy control and full protection to motor, machine and operator. BROOK control gear is simply designed with a minimum of moving parts. The range is comprehensive, covering a wide variety of control features, direct-on-line, reversing, star-delta, multi-speed, etc. in the lighter horse powers. Automatic or hand-operated.

BROOK MOTORS LTD. HUDDERSFIELD

30/14

Remember

Poppy Day

Putting two and two together and making five ! At least, that's how it appears when you consider the saving in time and cost by changing over to tapping screws.
Without doubt, the tapping screw does display a number of very definite advantages over the conventional machine screw. It obviates the use of nuts. With its self-locating point, it forms its own thread and eliminates a separate and expensive tapping operation.
It makes for easier assembly, is stronger, cheaper and faster. And when used in conjunction with the Phillips recessed head, designed for power driving without damage to either work or worker, it is obviously safer. Putting two and two together, the tapping screw simply ensures a better job.
Why not change over to tapping screws and prove it for yourself?

Linread *tapping screws for economy and safety*

LINREAD LTD. COX ST. BIRMINGHAM 3

SLOTTED AND PHILLIPS RECESSED HEAD MACHINE SCREWS AND TAPPING SCREWS • HIGH TENSILE HEXAGON HEAD BOLTS AND SETSCREWS
AIRCRAFT BOLTS, SCREWS AND RIVETS • SEMS • RIVNUTS • CUSTOM DESIGNED COLD FORGED FASTENERS • ALEX SCREWPLUGS,

AGENTS AND BRANCHES COVER THE WORLD

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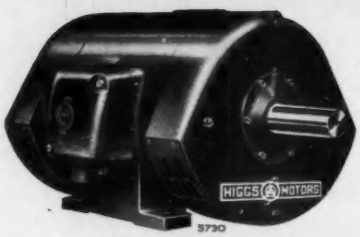
STANDARDISED DIMENSIONS
COMPLYING WITH B.S. 2960



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MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.

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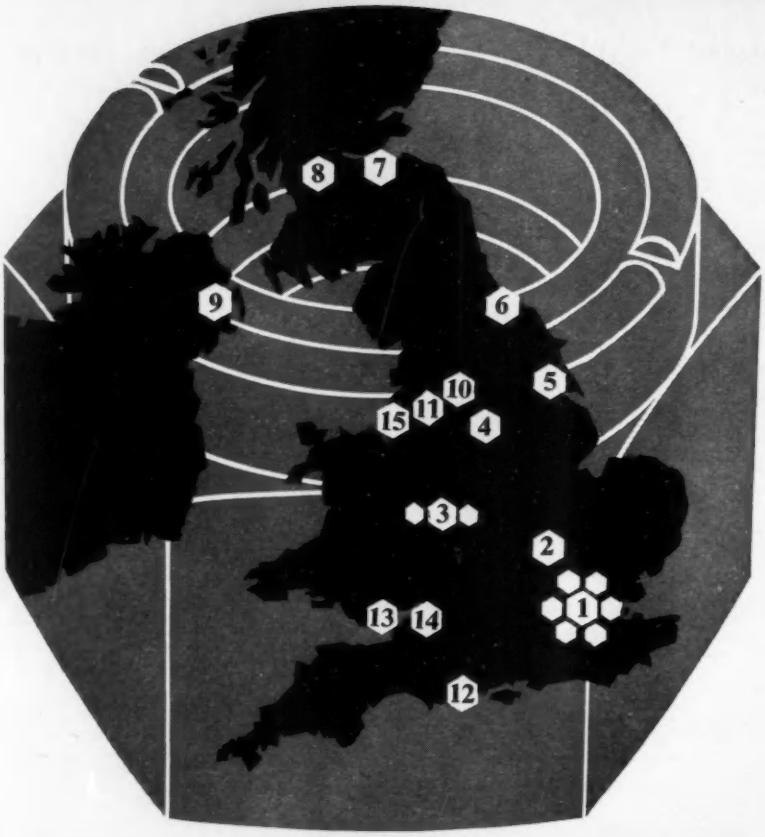
Appointed Stockists of NYLOC, FIBRE & PINNACLE self-locking nuts—the modern method of safe assembly



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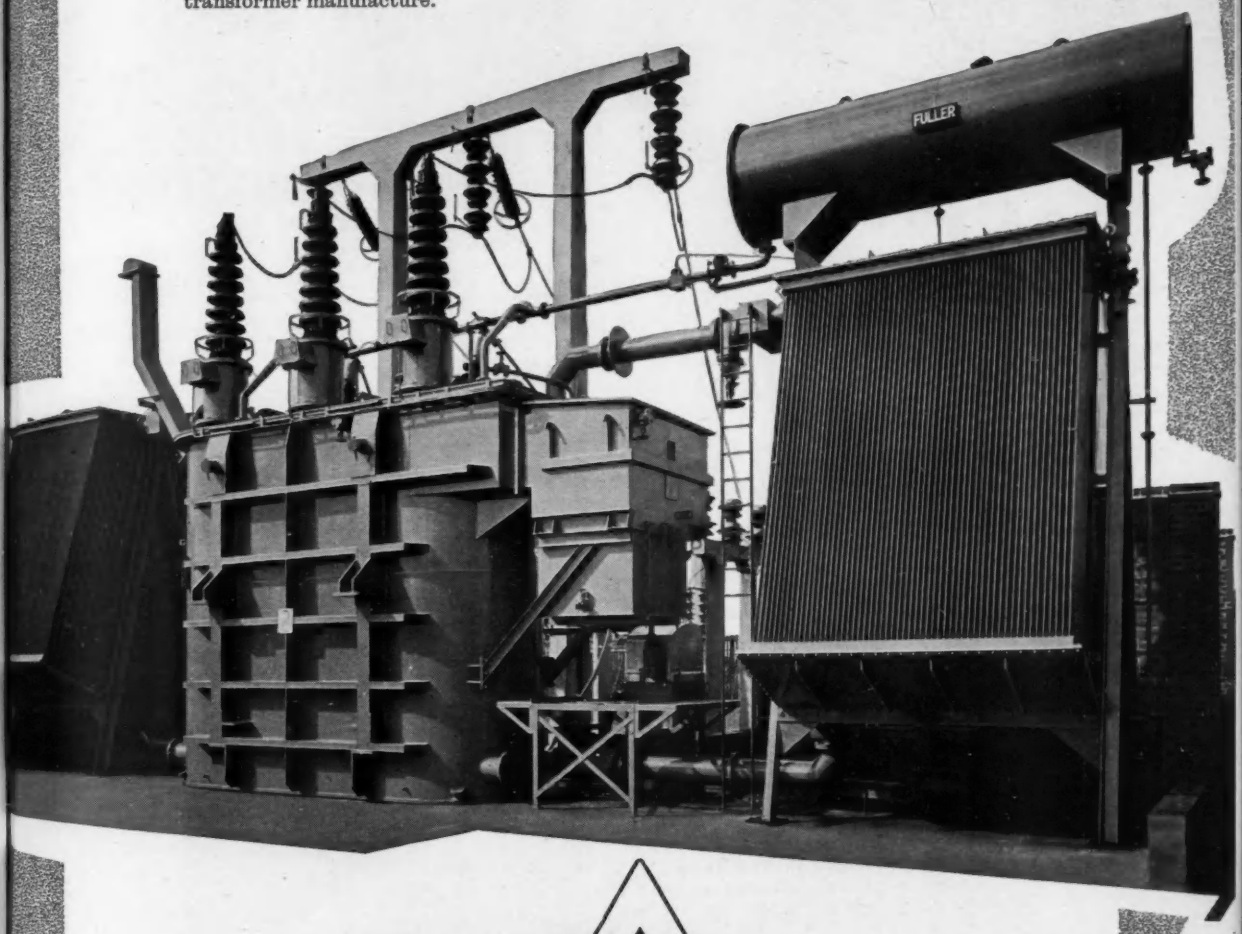
We have been building transformers since 1919. You will find our products in service throughout the world. We can build them up to the largest sizes, the highest voltages, and thanks to our long association with ASEA of Sweden, we have access to an unrivalled experience of 380 kV practice. With factory facilities which are as well planned and as well equipped as any in the world, and with our rigorously maintained, meticulous standards, we can justly claim to be among the leaders in transformer manufacture.



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- M.E.M. SWITCHGEAR AND STARTERS
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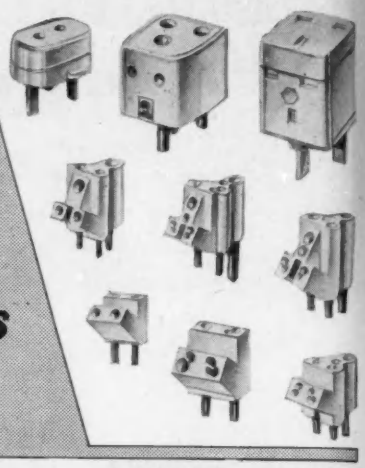

Grelco MULTI-PLUG ADAPTORS

Available in BROWN or WHITE

We also manufacture a complete range of
TERMINAL BLOCKS

GRELCO LIMITED
MINEHEAD - SOMERSET
Telephone: MINEHEAD 740
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Telephone: FREMANTLE 3371

Grelco Multi-Plug ADAPTORS are advertised in "IDEAL HOME" Magazine in October
Check your stocks NOW!

PARTRIDGE
P6000
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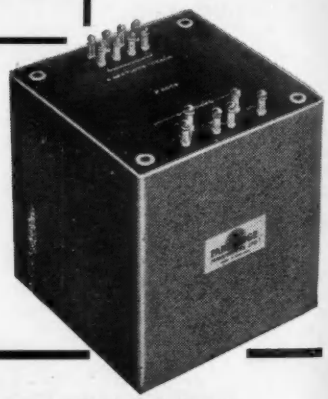
a range of push-pull Output Transformers



A standard range of Push-Pull Output Transformers of 100 watt POWER RATING suitable for use in equipment reproducing the full audio-frequency range with lowest distortion. Compound filled, in screened, robust steel cases intended for inverted mounting. Using latest grain orientated cores.

Write now for data sheet giving full information on this new Partridge Series

PARTRIDGE TRANSFORMERS LTD.
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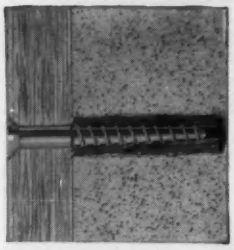
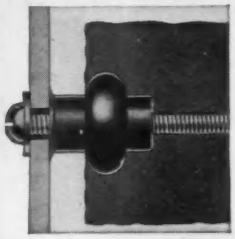
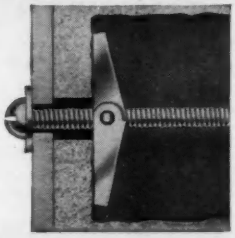
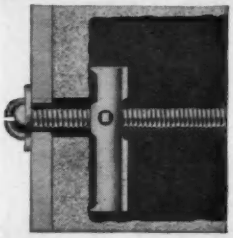
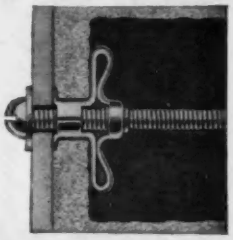
SOLID OR CAVITY MATERIALS





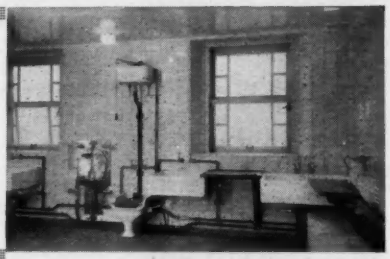




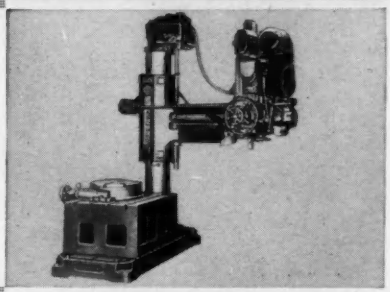


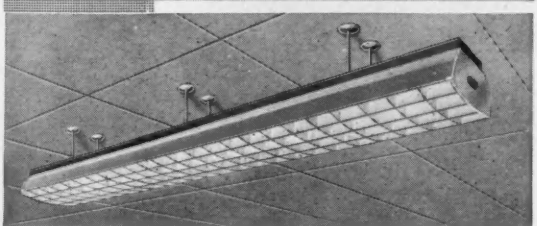
Rawlplug fixing devices save you time and money

SCREW FIXINGS *Use the famous RAWLPLUG for neat, firm fixings in brick, stone, etc. All sizes for up to ½" diameter Coach Screws. Rawlplugs are waterproofed and unaffected by climatic conditions.*



BOLT FIXINGS *For bolting down machines, light or heavy, use RAWLBOLTS, a dry fixing that grips by expansion. No cold chiselling, no waiting for cement to harden. Sizes up to 1" bolt diameter.*





CAVITY FIXINGS *The amazing RAWLNUT, screwed up from the front, forms its own rivet head behind the material—airtight, watertight, vibration-proof, squeak-proof! For all thin or hollow materials.*

Fixing methods that served well enough in bygone days fall far short of modern standards of efficiency, when an average machine can be safely bolted down *and in operation* within an hour or so of arrival!

Rawlplug Fixing Devices always save time and therefore money, for it is a simple *fact* that on *every* screw and bolt fixing job, in solid *or* cavity materials, you'll make strong, absolutely safe fixings in *far less time than by any other method.*

You can easily prove this for yourself. The first step is to write for full details of the 21 different types of Rawlplug Fixing Devices. Write us now —and if after studying our literature, you have any difficulties about a particular problem, our Technical Service specialists will be delighted to advise you without obligation.

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FIXING DEVICES

THE RAWLPLUG COMPANY LTD
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manual or automatic contacts, for large or small premises- we contract for installations or supply equipment.

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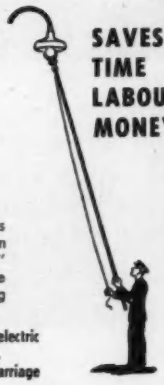
NO LADDERS REQUIRED

Telescopic appliance for fixing and removing electric bulbs. Any reasonable height can be reached.

Made of Aluminium and can be carried with ease on any cycle.

STANDARD MODEL
for 60 to 200 watt lamps at 16' 6" from ground. 6' 0" closed. 12' 0" extended. Weight 3 lb. Cycle clips and Extension Tubing supplied.

"A" MODEL
for 200 to 500 watt lamps E.S. Caps at 20' 0" from ground. 7' 0" closed. 16' 6" extended. Weight 5½ lb. Cycle clips and Extension Tubing supplied.



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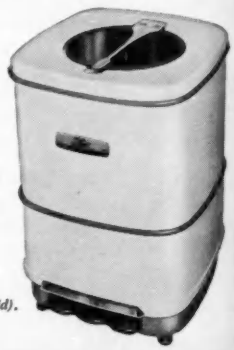

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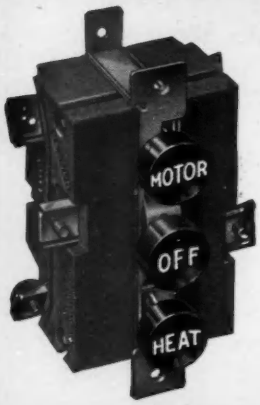

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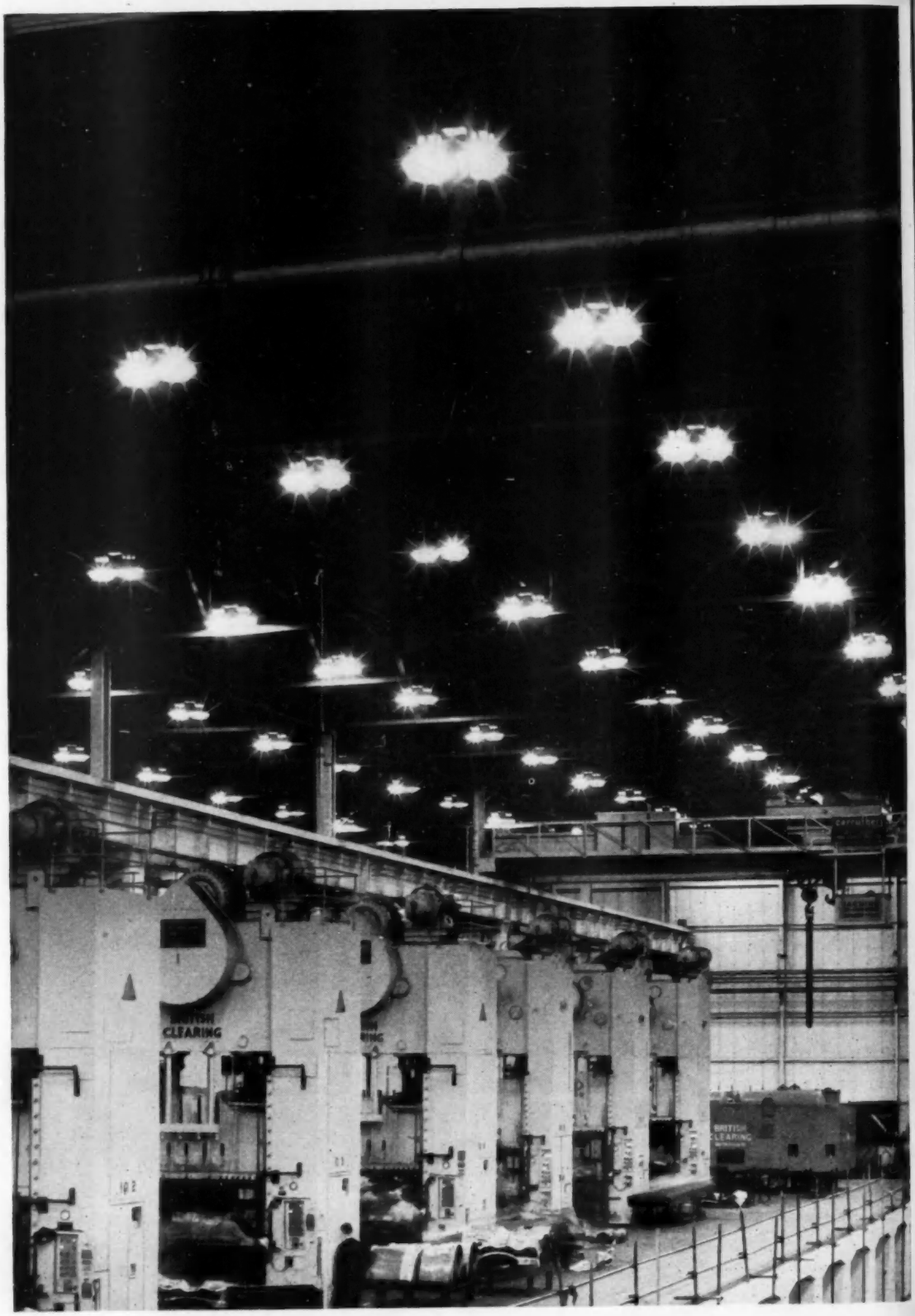
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Well-lit factories are essential for increased production. Lighting these factories is an achievement of which Revo are proud.
Today, factories, streets, stadiums, schools and public buildings all over the world are lit by Revo. Specialists in solving electrical problems, Revo's fifty years of experience extends over the whole of the electrical field—from industrial lighting to factory switchgear, from electronic equipment to domestic appliances.

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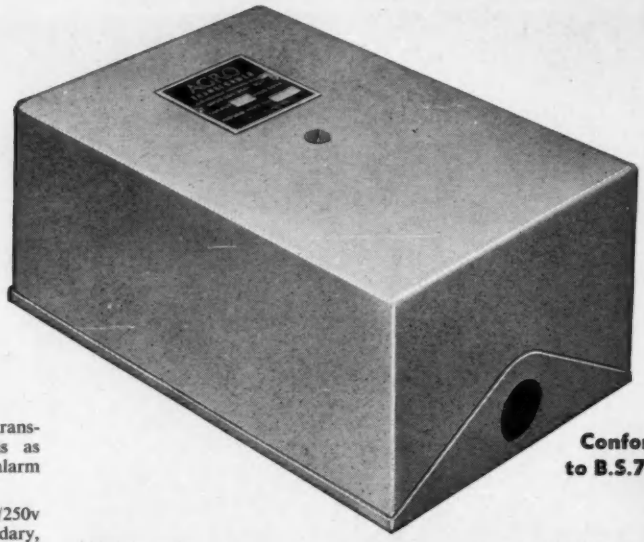
The AGRO *low voltage transformer*



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A METAL INDUSTRIES GROUP COMPANY
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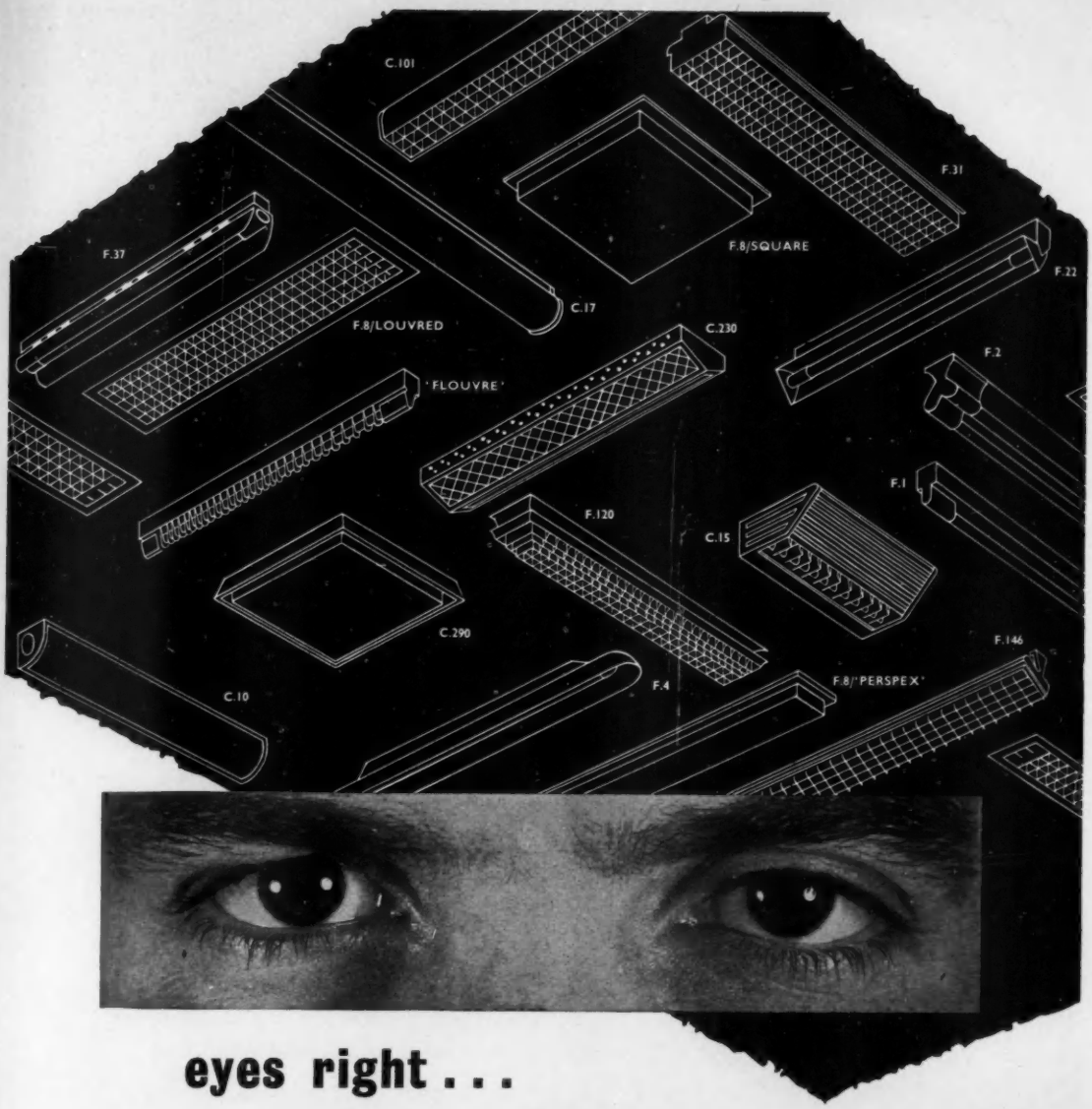

eyes right . . .

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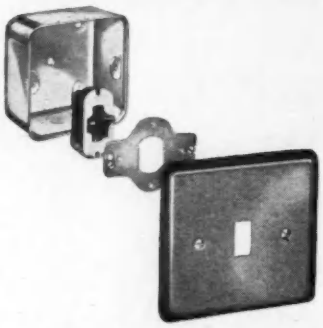

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15 amp. One way D.P. switch
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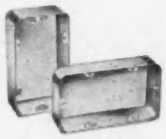
4779
Neon indicator unit
Red

4770
Blank inset
Brown or Ivory

SURFACE OR FLUSH BOXES

891



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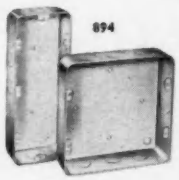

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893

895

GRIDS

3701

3702

3703

3704

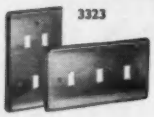
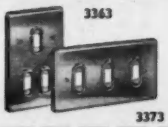
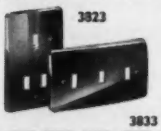
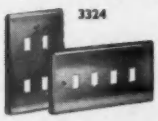
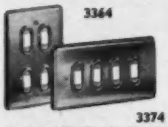
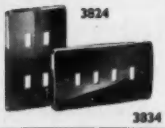
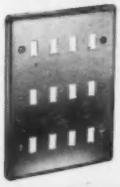
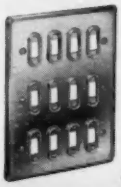
Two 3703

Two 3704

Three 3703

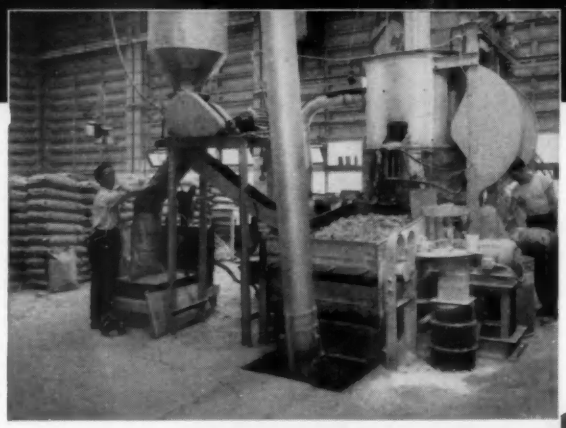
Three 3704

The GRIDSWITCH

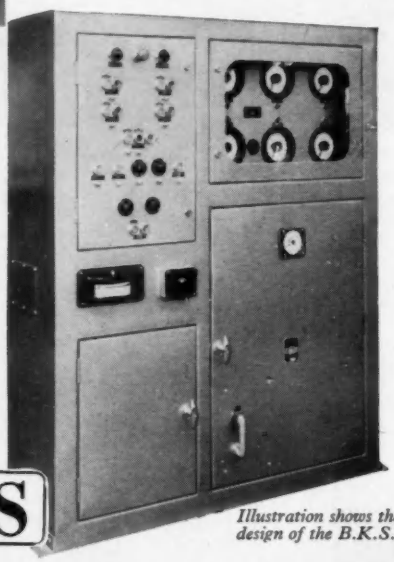
FLUSH PLATES			SURFACE PLATES	
Brass plates Finish—BMA or Matt Chrome	Protected Brass plates Finish-BMA or Matt Chrome	Insulated plates Finish—Brown or Ivory	Brass plates Finish—BMA or Matt Chrome	Steel plates Finish—Aluminium Stove Enamel
3331	3371	3831	3341	3381
3332	3372	3832	3342	3382
3323  3333	3363  3373	3823  3833	3343	3383
3324  3334	3364  3374	3824  3834	3344	3384
3326 3336	3366 3376	*6-gang available December, 1958*	3346	3386
3338	3378	*8-gang available December, 1958*	3348	3388
3339	3379	*	3349	3389
 3340	 3380	*	3352	3392

MK158DHB

120 HOURS A WEEK



Non-Stop!



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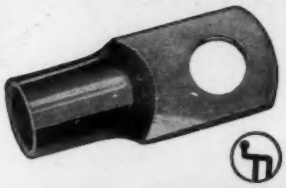

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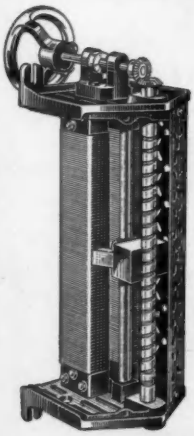

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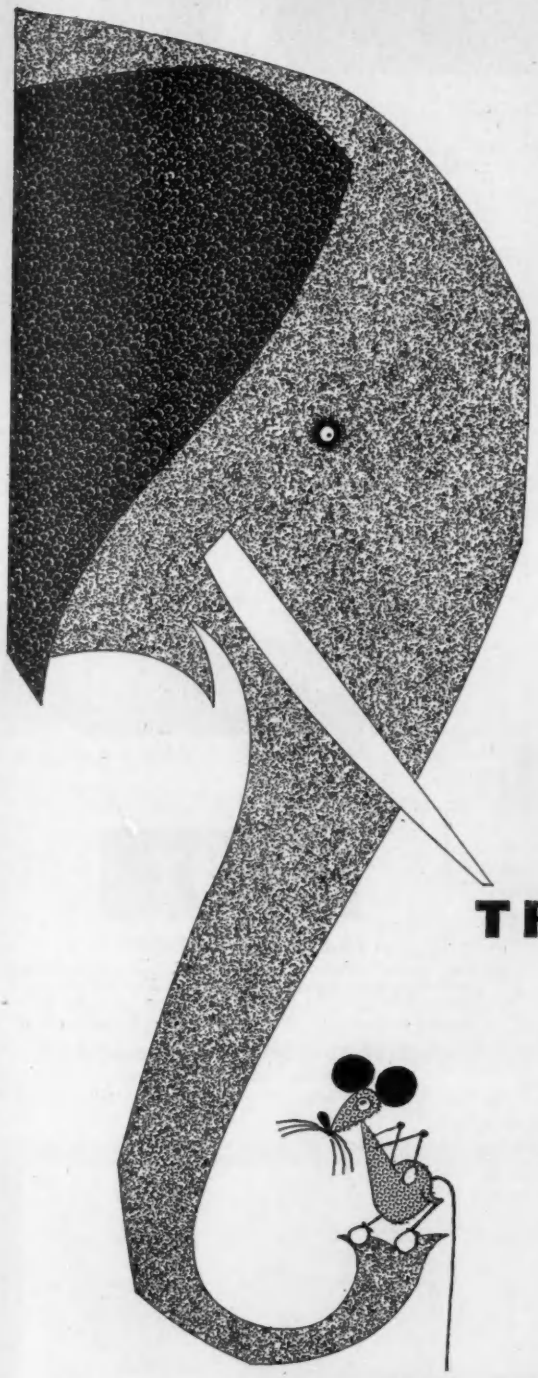

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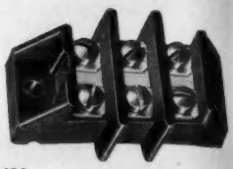

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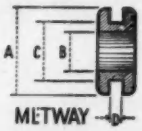

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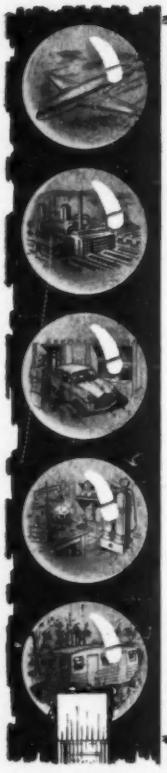

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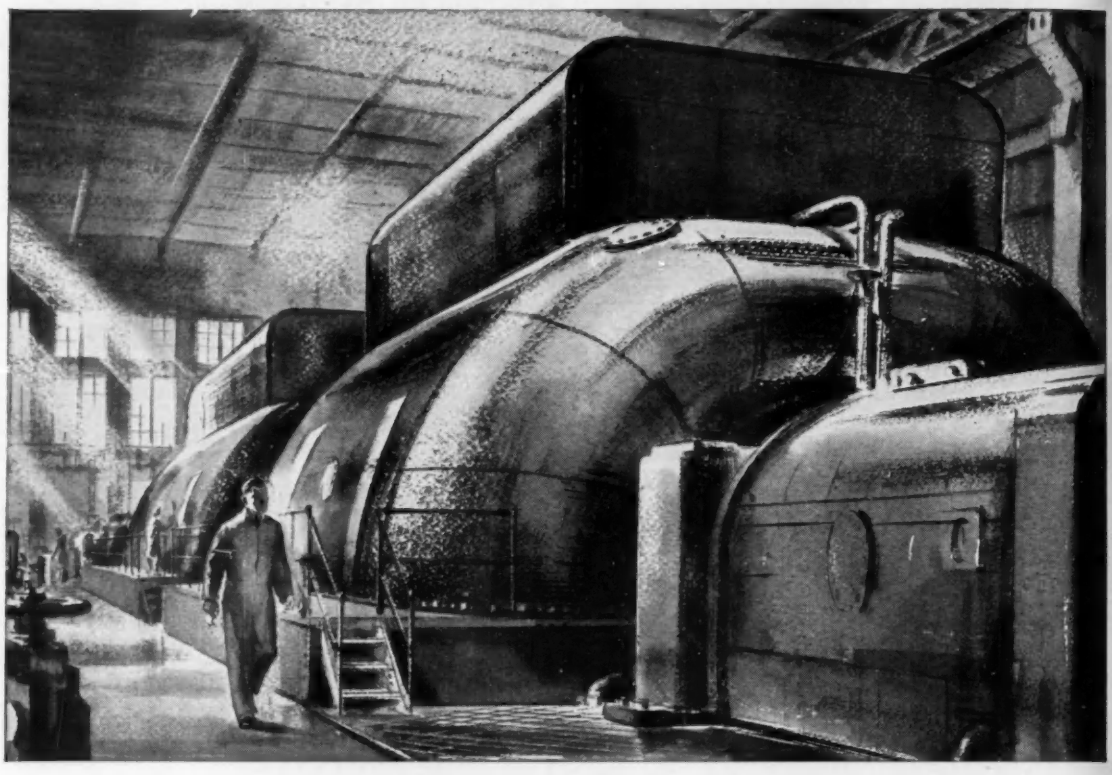

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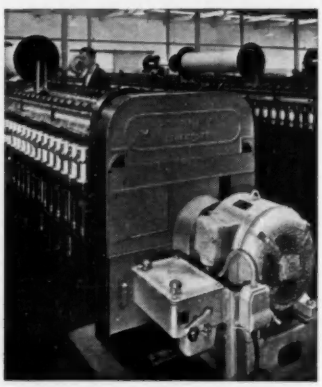
Nuclear power stations will play an increasingly important part in meeting the doubled demand for electricity forecast for the next ten years. Construction work is progressing rapidly at the sites of the Board's first three nuclear power stations, at Bradwell, Berkeley and Hinkley Point. The aggregate capacity of these stations will be not less than 1,100,000 kilowatts; and by 1966/7 some 5 to 6 million kilowatts of nuclear-generated electric power will be available.



Though these are projects which will not be completed for some time, the work of the Central Electricity Generating Board is playing an important part in today's fight against inflation. Power stations are being built now at an overall cost no greater than in 1948—£50 per kilowatt installed. And, although the output capacity of the industry has doubled since 1948, the increase in manpower is only about one-third.

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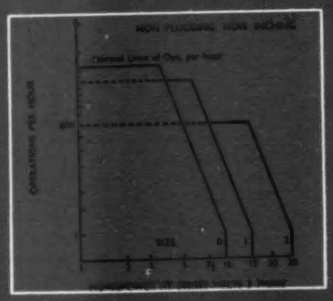

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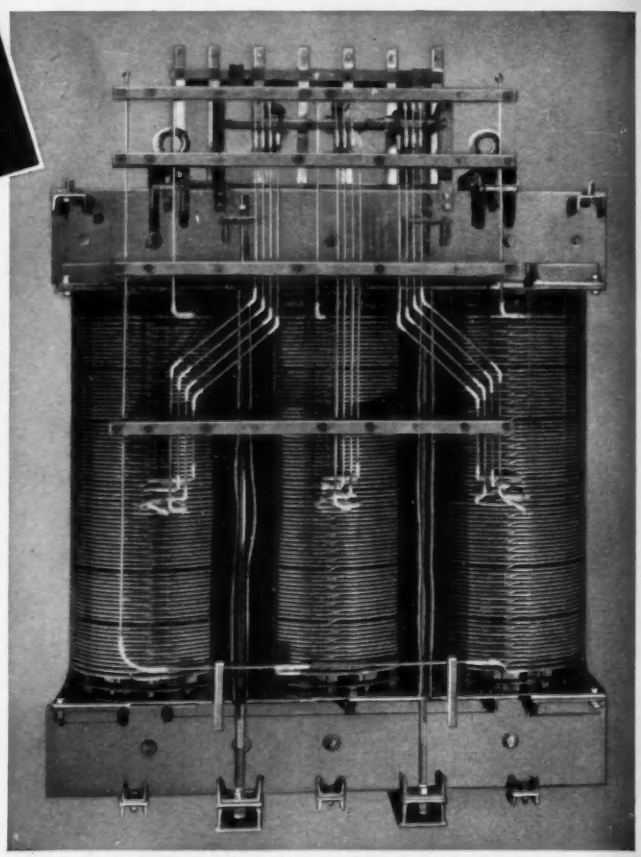

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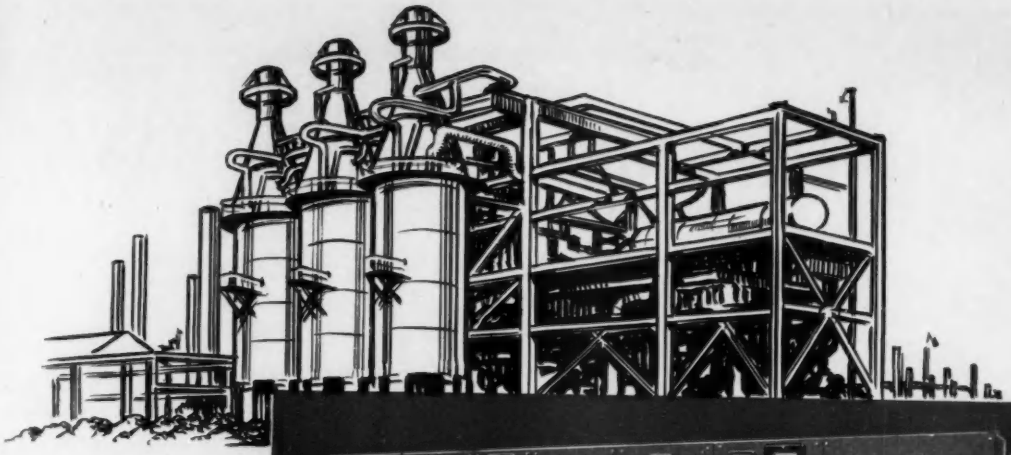

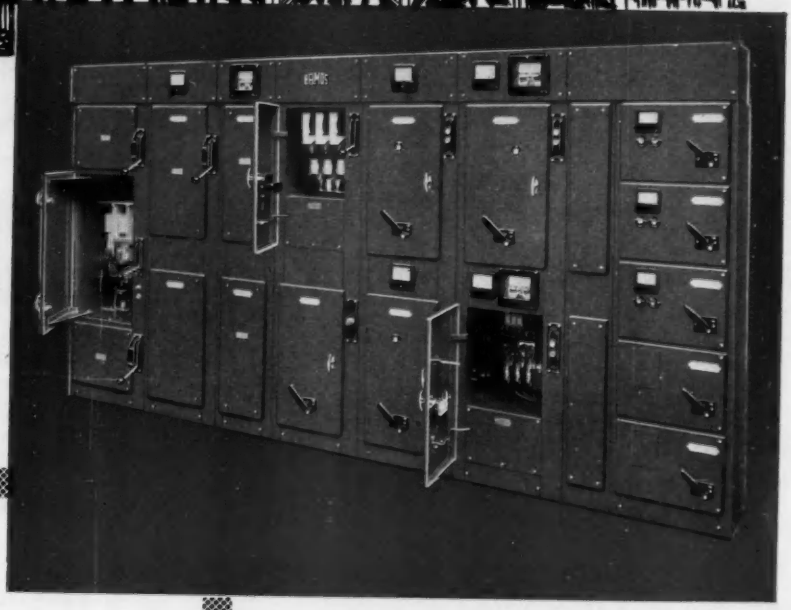

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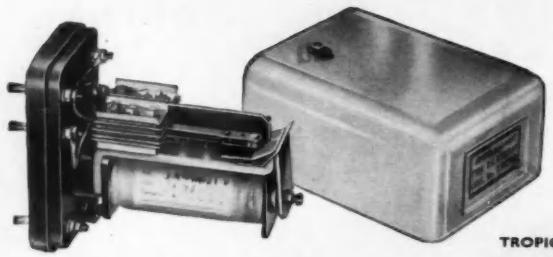

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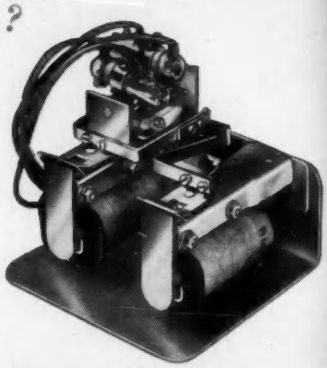

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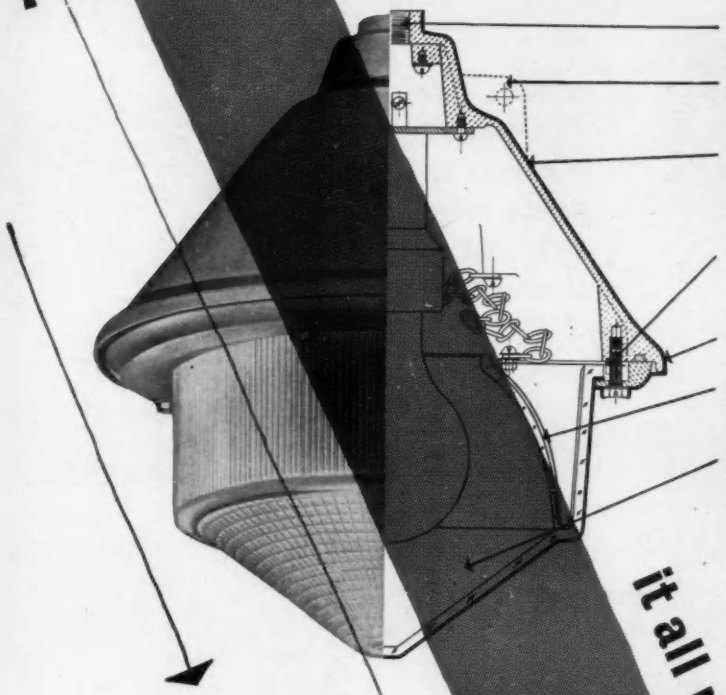

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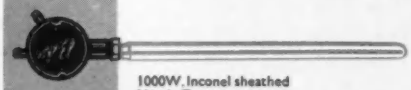

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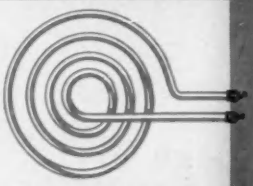

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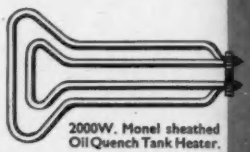

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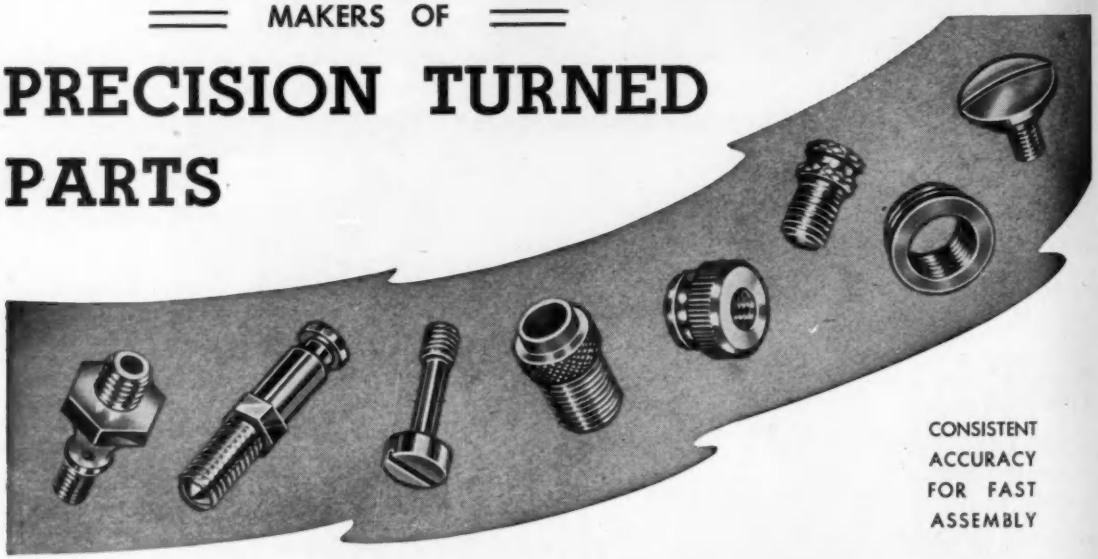

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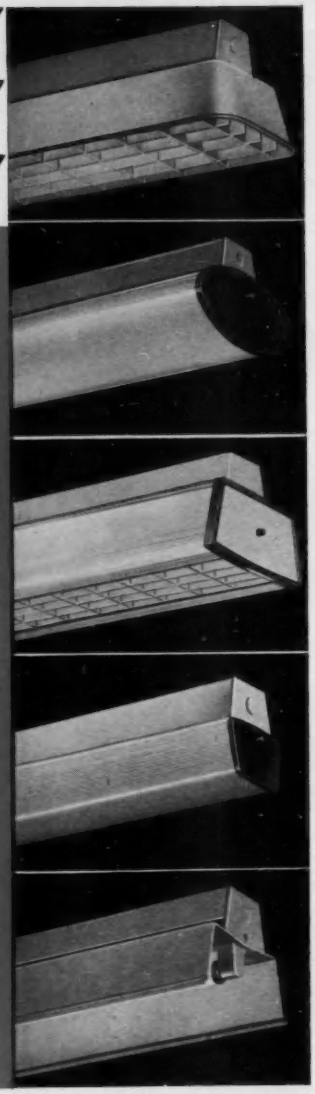

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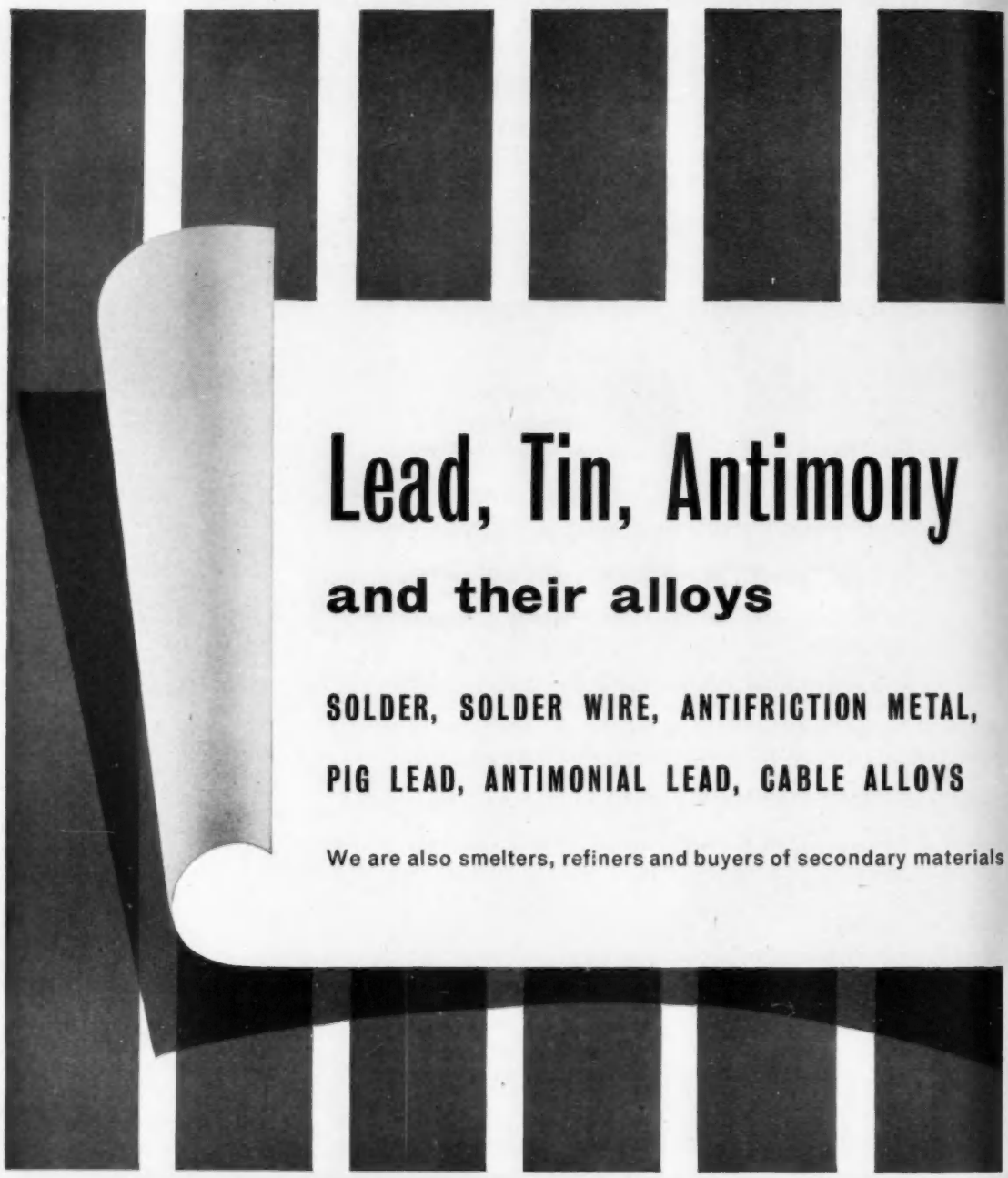
G.E.C.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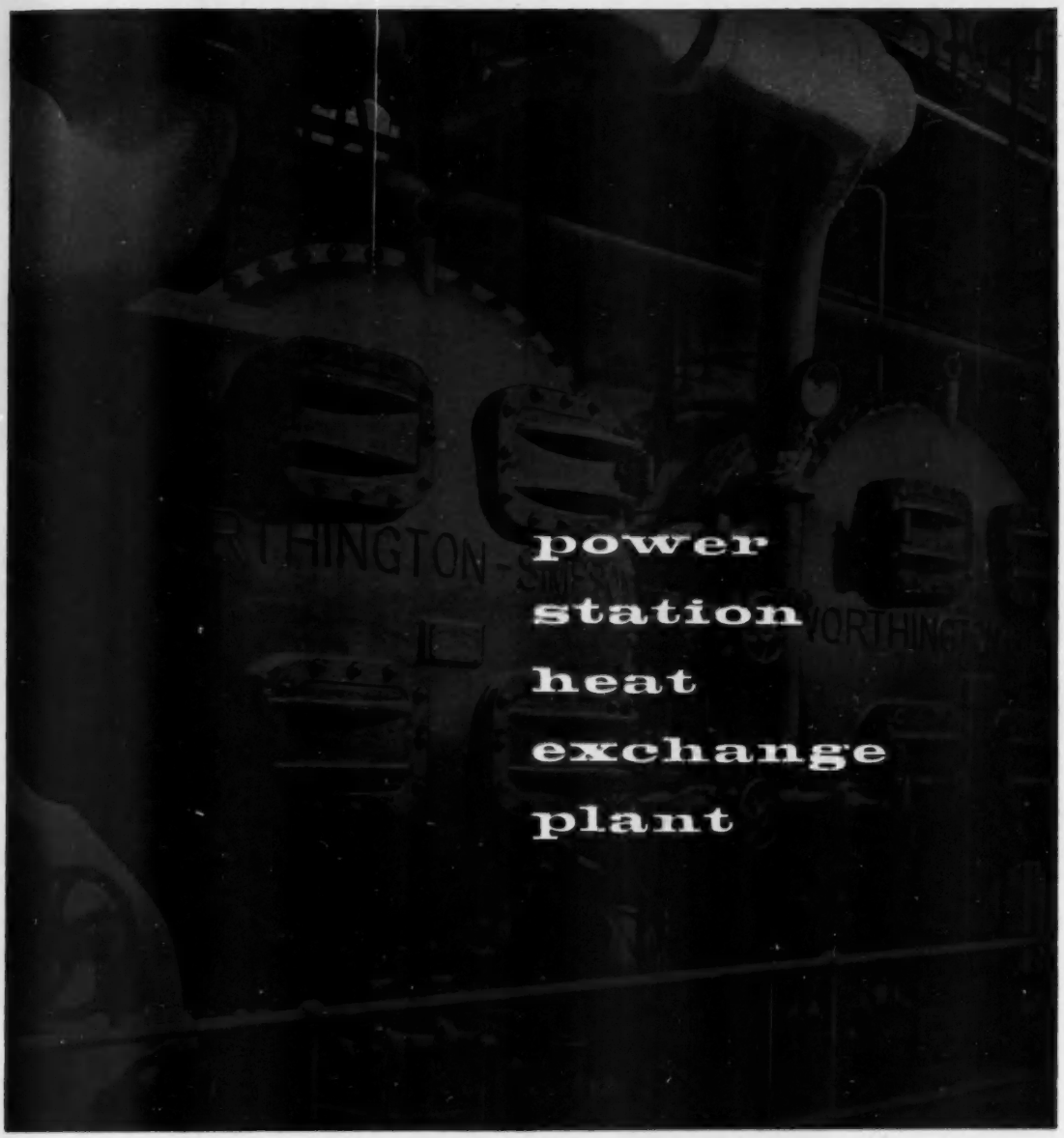

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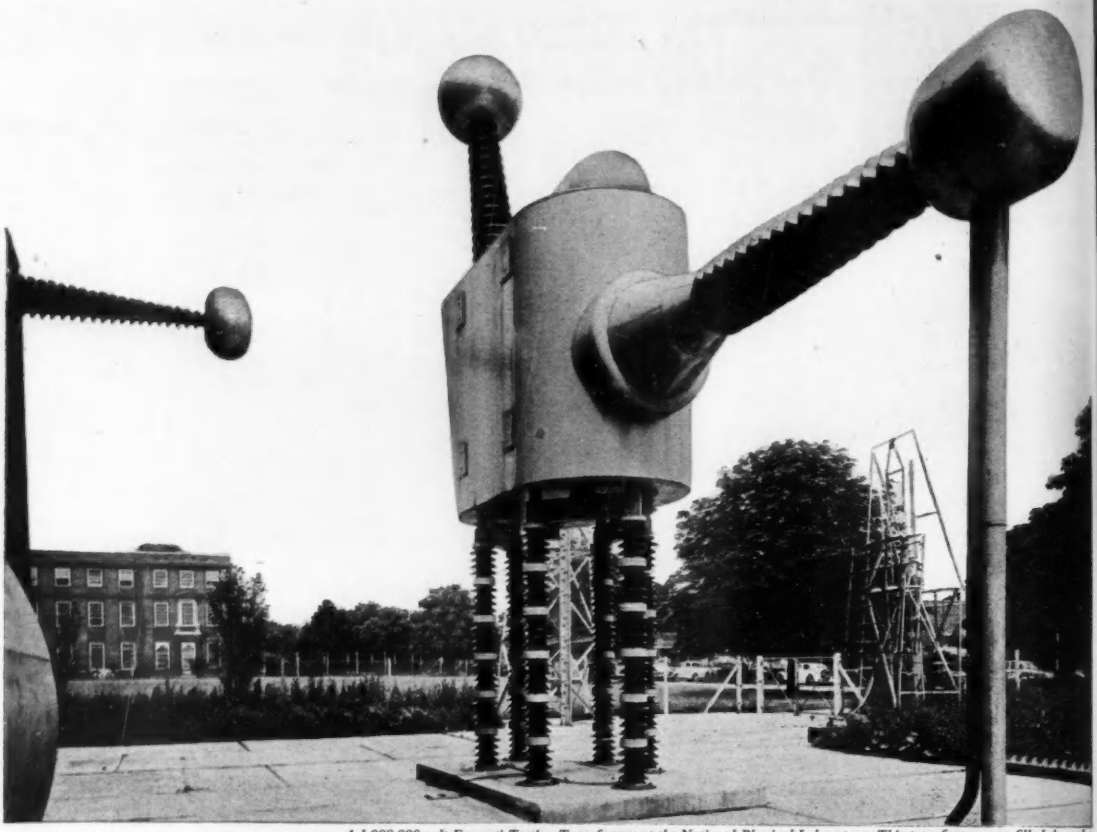

A 1,000,000 volt Ferranti Testing Transformer at the National Physical Laboratory. This transformer was filled through a Stream-Line CN 61 filter of 250 g.p.h. capacity. Photograph by courtesy of the N.P.L. and the Ministry of Works.

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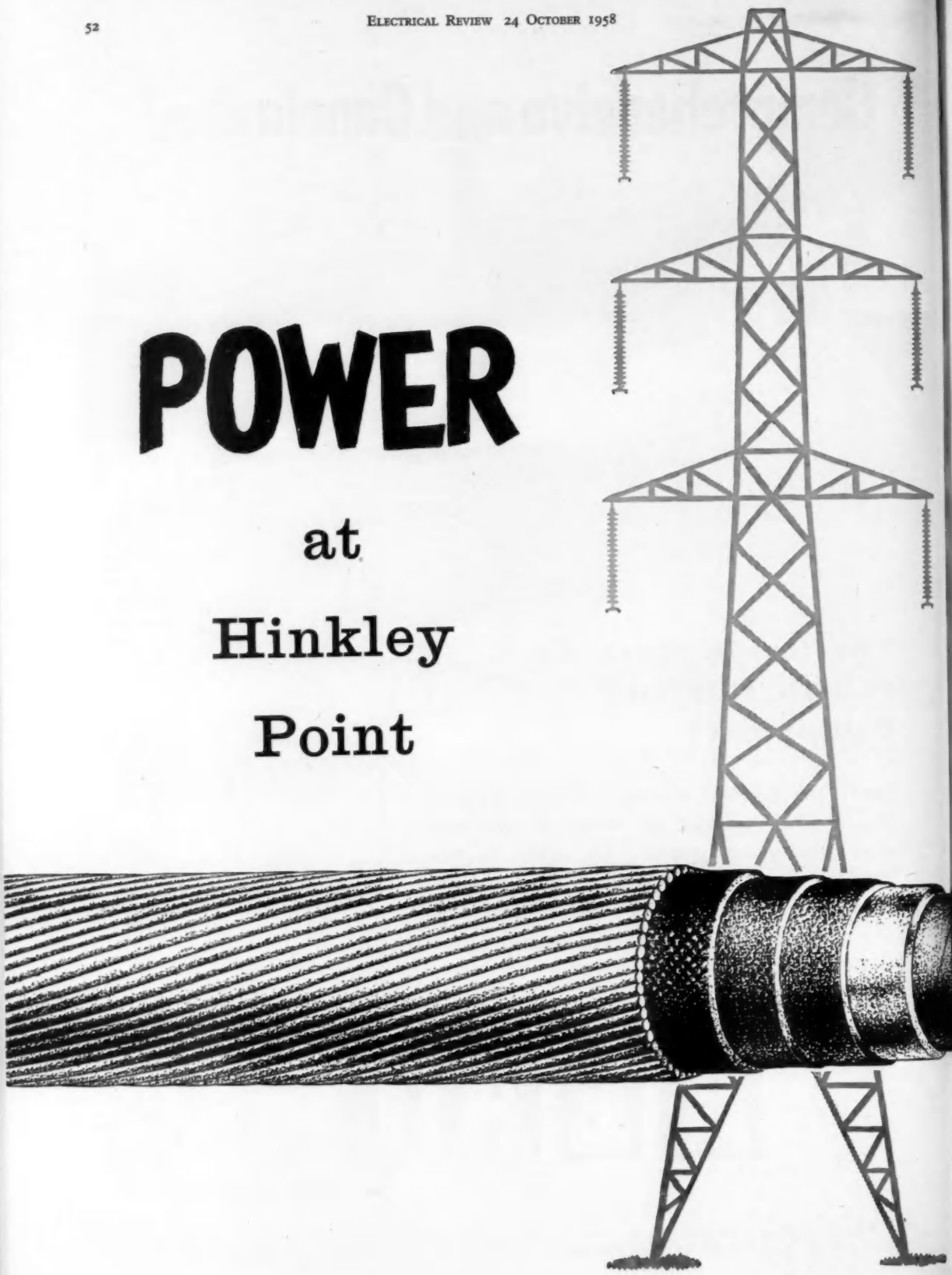
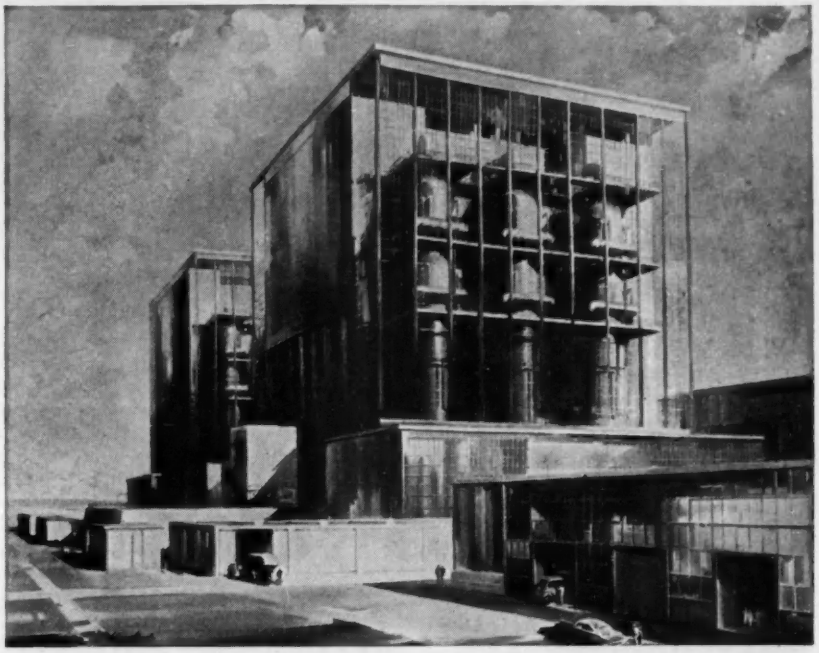
POWER

at Hinkley Point





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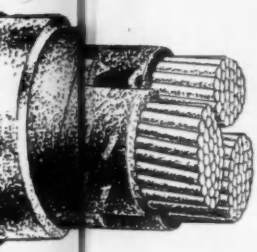
The BIC Construction Company have also been awarded the contract to supply and erect approximately 50 miles of 275kV overhead line for the National Supergrid between Hinkley Point and Melksham, Wiltshire.



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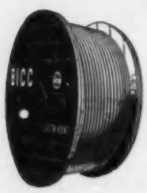

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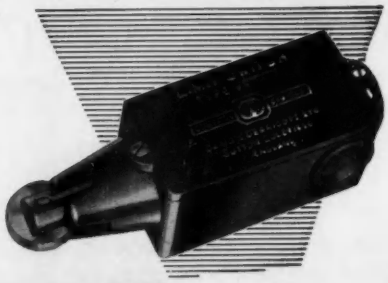

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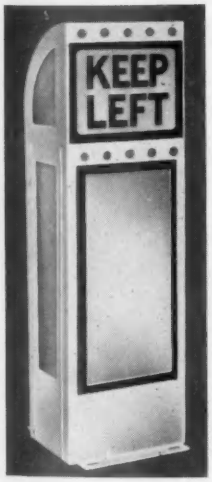

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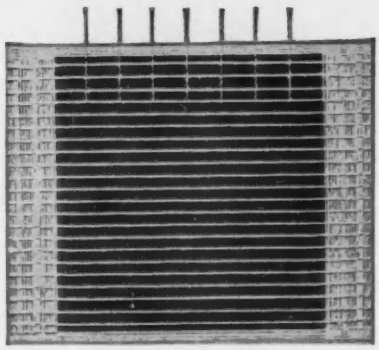

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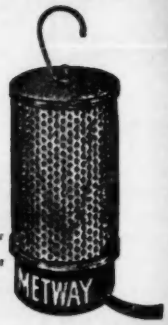

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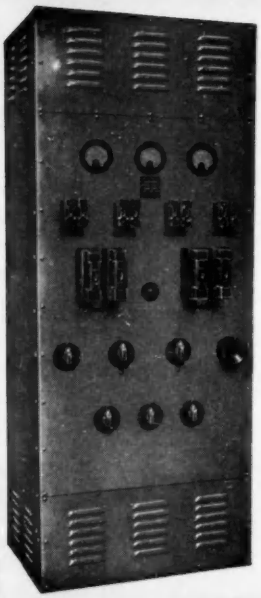

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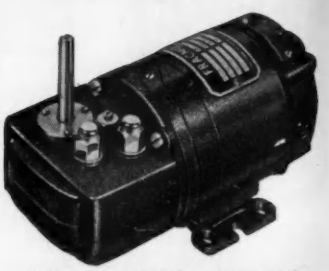

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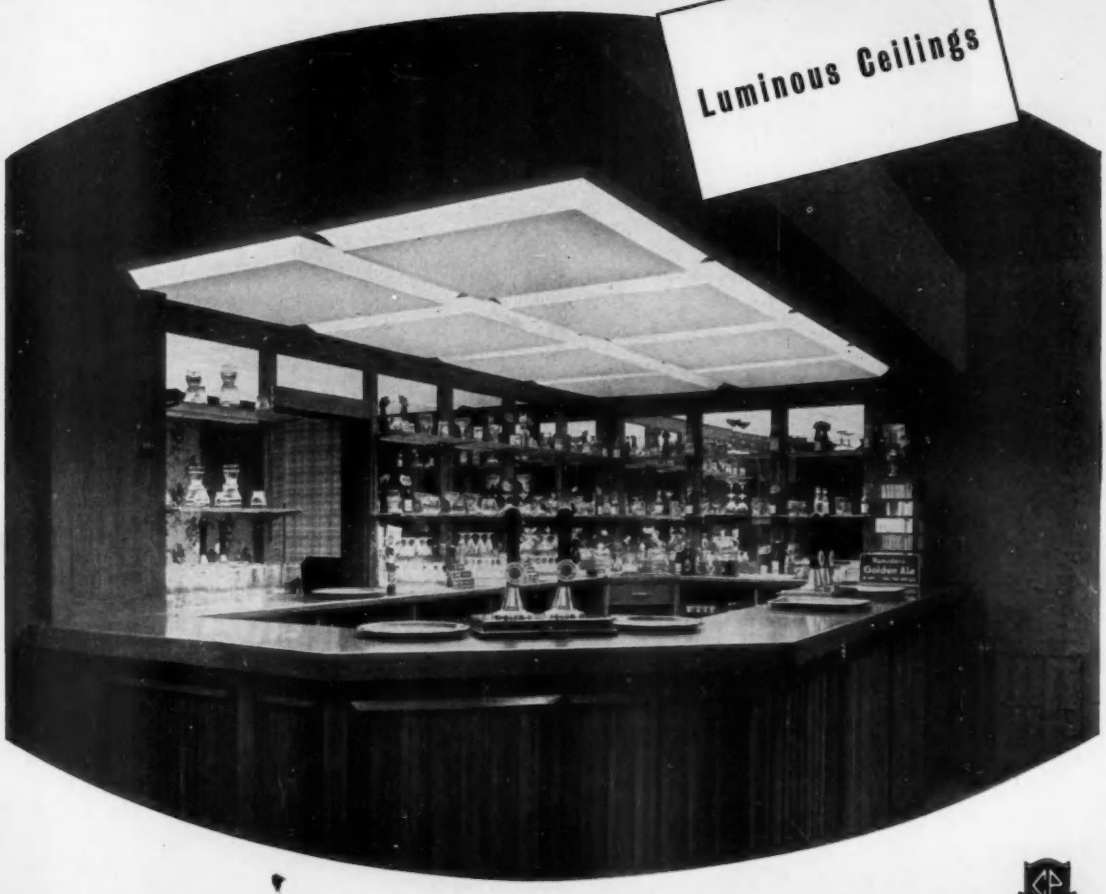

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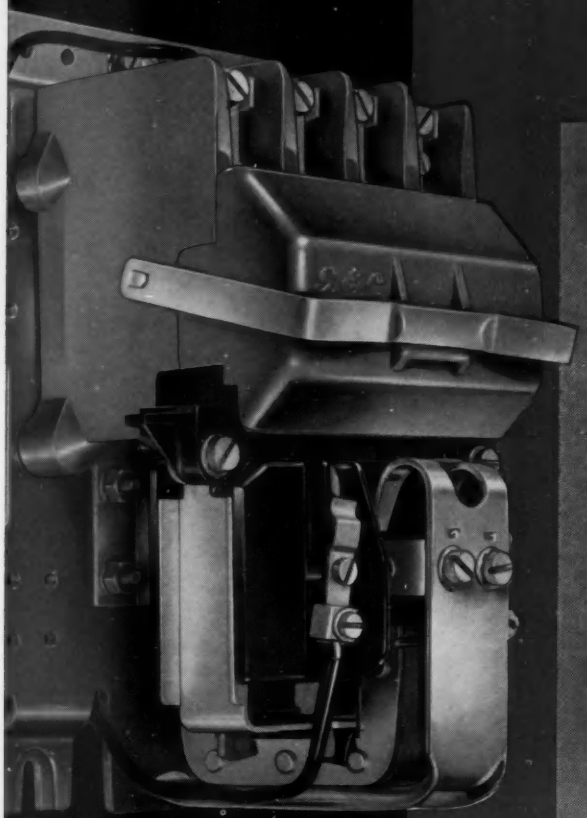
VERTICAL-LIFT

contactors



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G.E.C.

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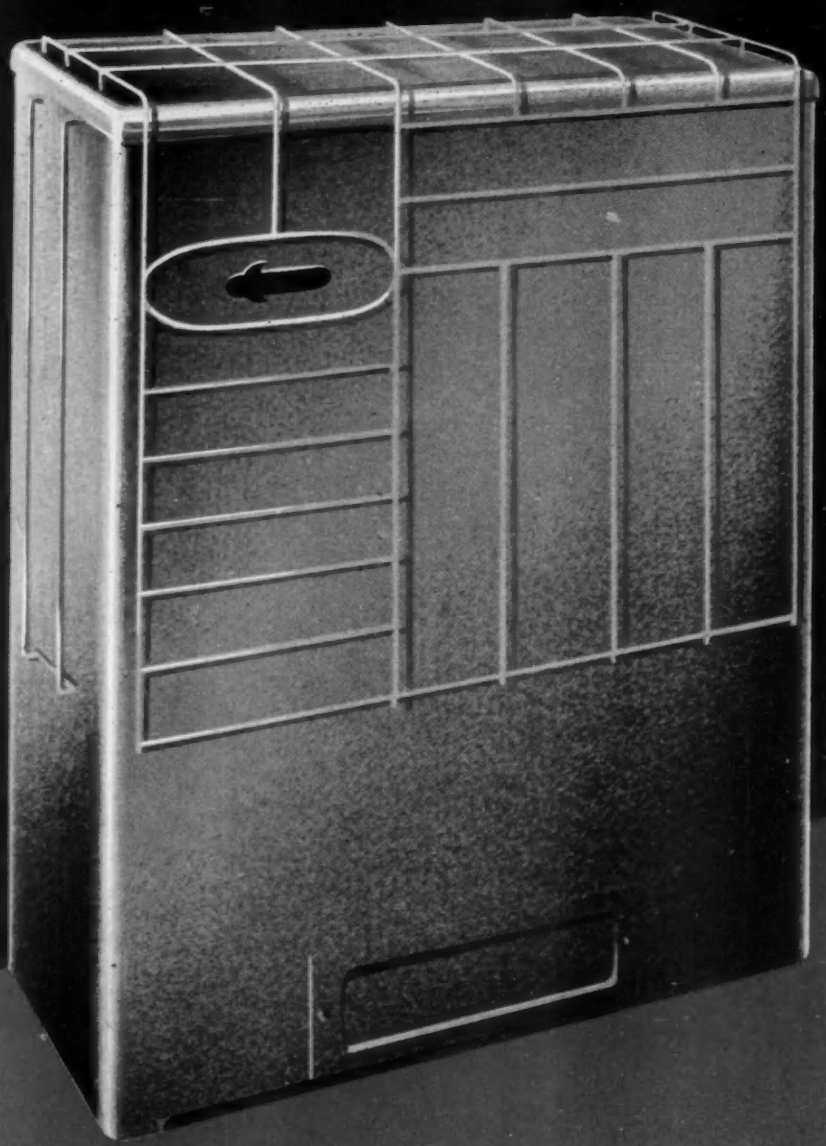
new Nightstor designs

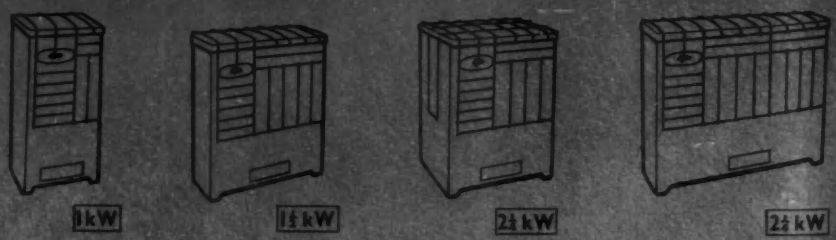


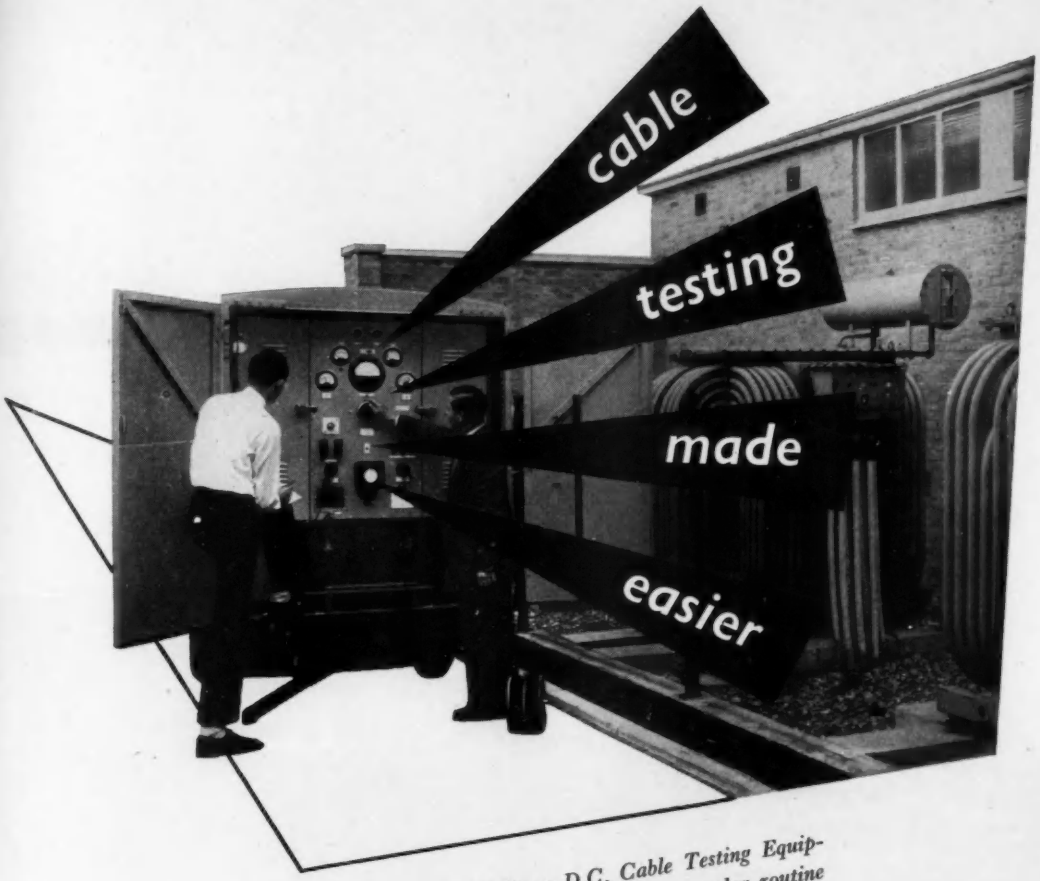
Nightstor HEATER

A

G.E.C.

PRODUCT





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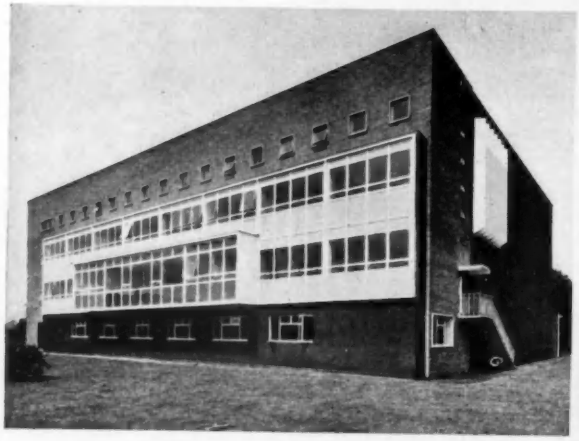

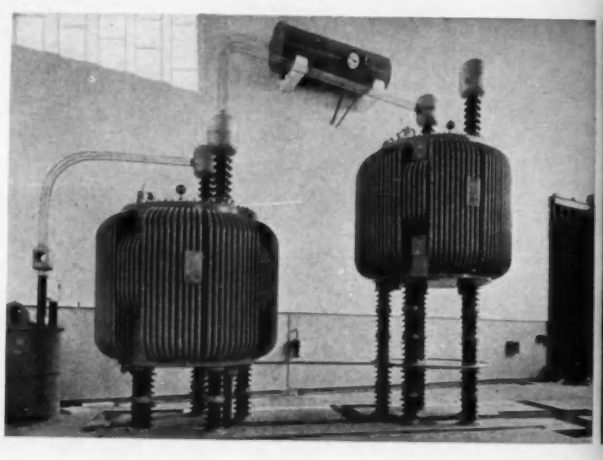

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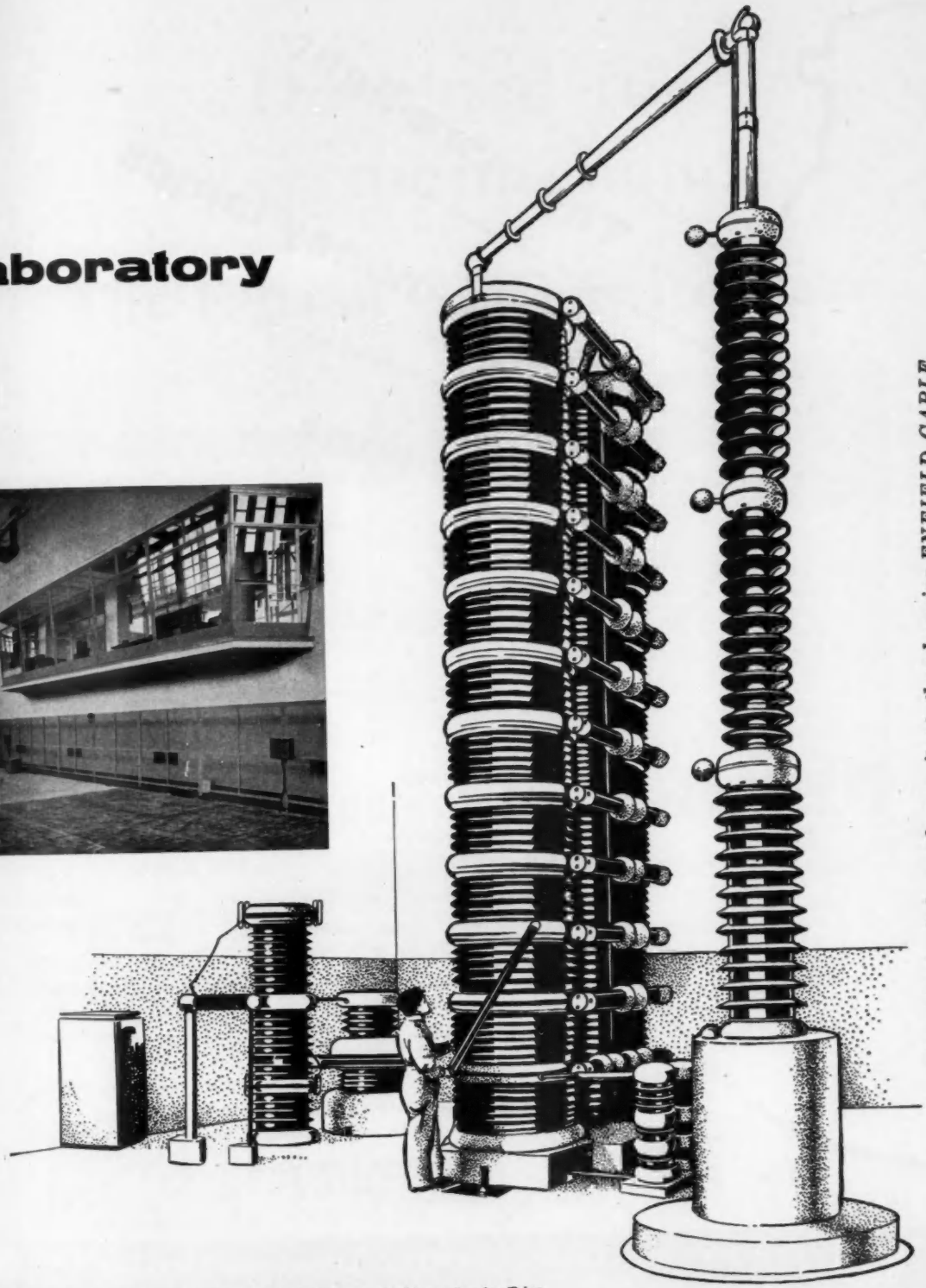

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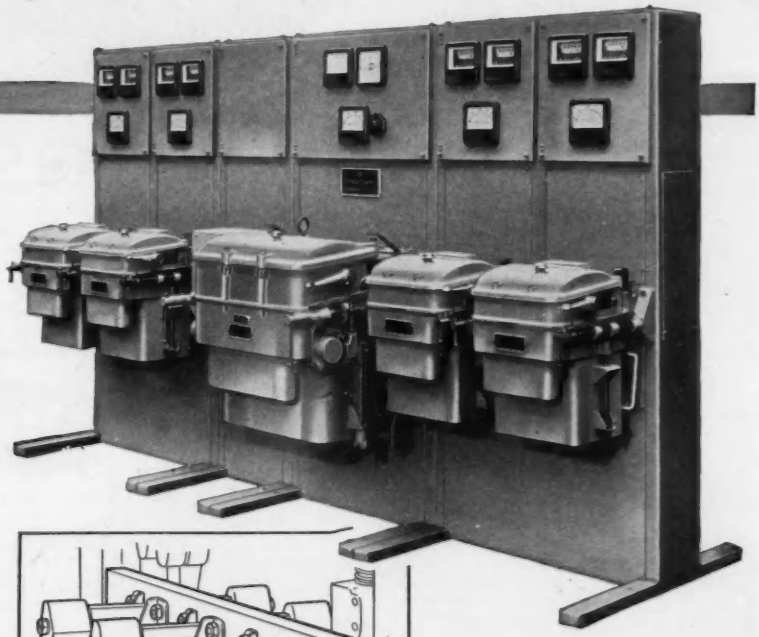

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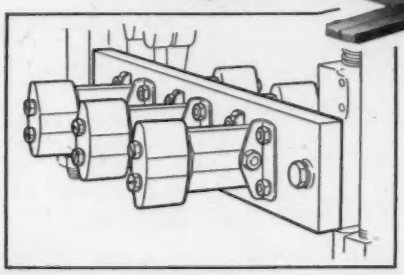

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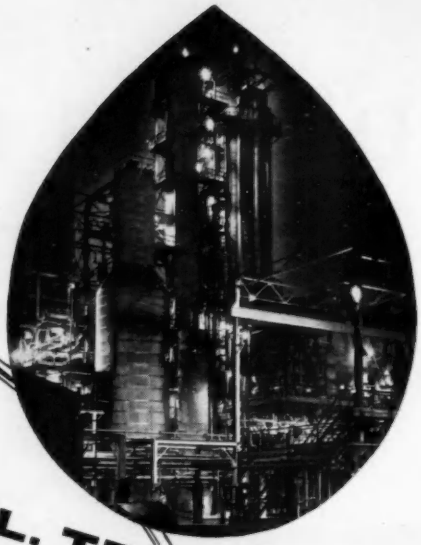

A Distillation Unit at the BP Kent Refinery, Isle of Grain. Photograph by courtesy of The British Petroleum Co. Ltd.

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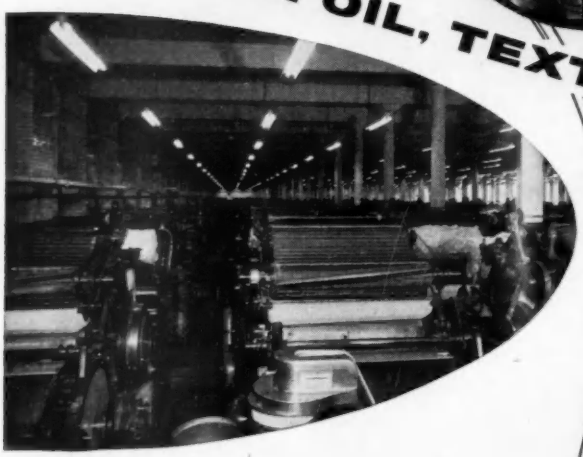

Lighting installation in a Spinning Mill. Photographed by courtesy of Messrs. J. & P. Coats Ltd., Paisley.

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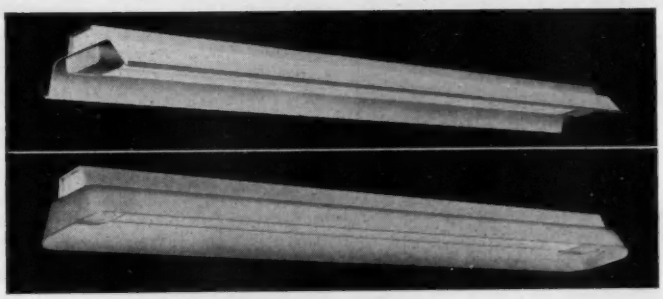

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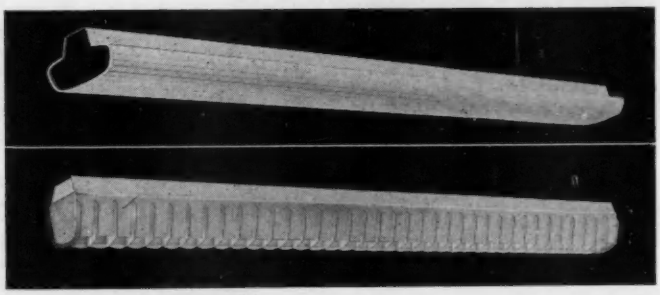

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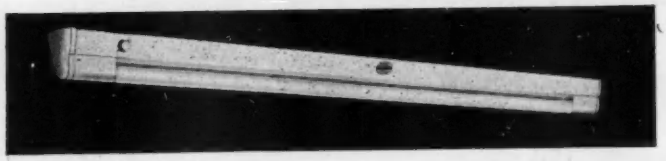

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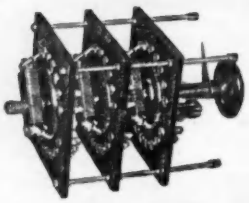

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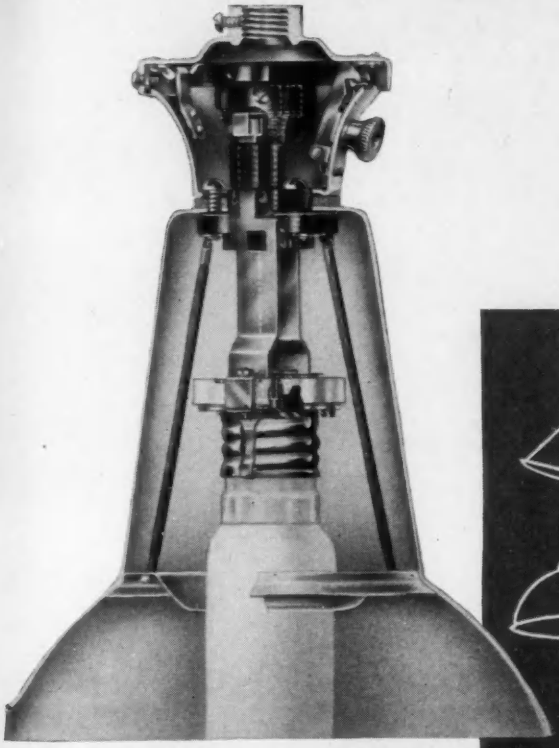

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FRIDAY
24 OCTOBER
1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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VOLUME 163 NUMBER 17 ✧ *Eighty-Sixth Year of Publication* ✧ FRIDAY PRICE 1s 6d

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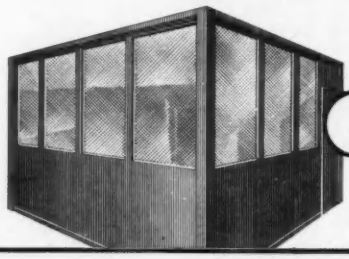

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ELECTRICAL REVIEW

24 October 1958 Vol. 163 No. 17 Established 1872

Cable Insulation

WHATEVER the means of producing electricity for whatever purpose an essential common factor is the use of insulated conductors to distribute the output. From the time when the first commercial cable was designed by W. T. Henley about 120 years ago, techniques have been continuously developed to match the diversified applications of electricity as they have come increasingly into being, so that both engineering design and manufacturing processes are able to meet the infinitely more complex requirements of today. This claim can be substantiated for the earliest use of cables in telecommunications by reference to the transatlantic and other long distance achievements in telephony. Likewise in the later development of power transmission the present stage is exemplified by the order for 275 kV cable, reported last week, for connecting Hinkley Point nuclear power station to the supergrid, and the d.c. link with the French high-voltage system.

The subject was most opportune as the main theme of this year's presidential address to the Institution of Electrical Engineers, an abstract of which appeared in our last issue. Against a historical background of evolutionary advance, Mr. S. E. Goodall considered the continuation of present trends and departures from former practice to cope with the rapidly increasing electrical demands of post-war years, leading up to an indication of probable future lines of progress. Much is due to the chemical industry on account of developments, for instance in plastics, which have proved indispensable in modern telephony and of great value in reducing the size of small wiring. Oil-impregnated paper, however, seems likely to hold its own for larger power cables in view of its known ability to withstand the effects of periodic heating cycles and short-circuits.

The rapidity with which new varieties of insulation are being introduced has been somewhat embarrassing having regard to the heavy capital expenditure incurred on plant in adapting their differing characteristics to electrical purposes. This diversity is apt to raise acutely the old question of how far freedom from standardisation should be carried before the possible economic merits of some technical improvement and the encouragement it offers to inventiveness are nullified by the disproportionately high manufacturing cost entailed, including interference with works production, in meeting possibly limited fields of usefulness.

Another aspect of standardisation to which Mr. Goodall referred is the extent to which British Standards could profitably be reconciled with some features of Continental practice. The President's deprecation of any tendency to a lowering of standards appears well founded on any long-term view. It will be accepted, however, that electric cables of progressively improving designs will be needed in an ever-increasing degree in the foreseeable future.

ADEQUATE INSTALLATIONS

In our last week's issue Mr. J. I. Bernard of E.D.A. showed how relatively slowly the average dwelling was being properly equipped from the electrical point of view. The same is true, although perhaps to a less degree, of commercial and industrial premises. Therefore great importance and interest attaches to a symposium on " The Provision of Adequate Electrical Installations in Buildings " which is to take place at the Institution of Electrical Engineers on 27th November. This symposium is intended to interest not only members of the Institution but also architects, builders, contractors and others, who are invited to attend and take part in the discussion. Four papers will be presented and discussed: —" Multi-storey Flats and Maisonnettes," by Mr. C. A. Belcher, M.I.E.E.; " Houses," by Mr. C. C. Hyams (president, Electrical Contractors' Association); " Commercial Buildings," by Mr. E. E. Jacobi, M.I.E.E.; and " Small Industrial Premises," by Mr. J. A. Sharp.

The papers will emphasise the advantages, in safety and convenience, of adequate wiring installations in various types of buildings, and will be introduced by Mr. R. A. Marryat, M.I.E.E., chairman of the Utilisation Section of the Institution and a past-president of the Electrical Contractors' Association. They will be presented during the afternoon and discussed at the evening session.

" FORWARD SCATTER " HAZARDS

Last week *The Times* set the cat among the pigeons by printing a gruesome picture of what might happen to anybody who got into the path of the beam from one of the proposed N.A.T.O. " forward scatter " radio links. It was suggested that such an individual would be internally cooked by a kind of diathermy resulting from the v.h.f. radiation—in fact there would actually be a " death ray " of the kind popularised by science fiction. One result of the article has been the deferment by the Isle of Wight County Council of planning permission for a new high-power R.A.F. radio station. The Americans have said that they are already aware that there may be some risk of injury from this type of transmission but the magnitude seems to be unknown. *The Times* reports a Ministry of Defence official as saying that the dangers had been exaggerated.

In any event it is believed that the proposed stations will either be on heights or their beams will be directed upwards, thus avoiding anybody on the ground. The subject is being investigated and the results may be of considerable interest from other aspects than that of danger to human life.

POWER STATION EFFICIENCY

Castle Donington power station, near Derby, the official opening of which took place earlier this week and is referred to elsewhere in this issue, is the most efficient generating station in this country. It was originally designed to have an overall efficiency of about 32 per cent (kWh sent out) and this figure was achieved soon after the first set was commissioned. For the year ended March, 1957, when just over 250 million kWh was sent out, the efficiency was 31·53 per cent. In the following year, when 1,255 million kWh was sent out, the figure rose to 32·16 per cent. During the present year the weather has been such that it has not been necessary to use the cooling towers and an efficiency of something like 33 per cent has been achieved.

Undoubtedly the building of power stations of this size and type has been responsible for the raising of the overall thermal efficiency of generation in this country from under 21 per cent in 1948 to 25·51 per cent in 1958. It is obviously a matter of national importance that the construction of such high efficiency stations should be expedited to enable the smaller and less efficient older stations to be taken out of commission.

EXPORT TRADE BAROMETER

Indications are that international trade is temporarily slowing down while productive capacity continues to expand, which means that competition between the leading industrial nations in export markets has become more intense. Knowledge of the world markets and continued study of trends, always necessary in export trade, have become even more important.

Under the general heading " market research " this may be an elaborate and expensive undertaking and many firms will be grateful to the General Electric Co., Ltd., for producing its quarterly " Export Guide " which has just entered its third year. This Guide is a good example of " enlightened self-interest " for while it brings the G.E.C.'s name before a good many influential people it is available to those in competition with the company. It is a concise and handy " barometer " of the economic and trade conditions in many countries and commodity groups.

GAS ENTERPRISE

Faced with the increasing scarcity and rising cost of its traditional raw material, good carbonisation coals, the gas industry is tackling with vigour and apparent enthusiasm the task of developing new processes and sources of supply. Nearly a third of the new plant installed last year was for the gasification of oil; a plant is being built for the complete gasification of poor quality open-cast coal; and the first shipload of liquefied natural gas is due to arrive in the Thames early in 1959. This new pattern of gas supplies also includes the construction of a national high pressure grid.

Similar enterprise is shown in connection with domestic appliance sales, though a loss was registered here by all but three Boards. A " Seal of Approval " for appliances has been introduced and success is claimed from the use of travelling showrooms and even the renting of stalls in market places. There is no hint of a restrictive attitude, still detectable in some Electricity Boards, towards the acceptance of certain types of load. The Gas Council report could, therefore, be read with profit by those in the electricity industry who discount gas competition or hold the view—too often heard—that " electricity sells itself." With sales of electric cookers less than half those of gas cookers, electricity, despite its many other successes, cannot be said to be dominant in the domestic field yet.

Electromagnetic Transducers

In modern generating stations electromagnetic instrument transducers are finding an increasing number of applications in the remote transmission of information regarding the operating conditions of steam raising plant and turbines. The author explains the reasons for the adoption of this system and discusses the basic principles of operation in some detail. The main body of the article, however, is devoted to descriptions of typical applications of transducers in power station schemes of instrumentation

Applications in Power Station Instrumentation

*By M. T. MASON**

As a result of present-day power station design trends, electromagnetic instrument transducers are finding increasing application in both the steam-raising and turbine sections of thermal generating stations, and the coming of nuclear power further emphasises the need for robust and reliable remote indicators for a wide variety of physical variables.

In process industries, where the control panels are centralised, the remote transmission of instrument information is often carried out successfully by pneumatic methods. The quantity to be measured is converted at the measuring point into a variable air pressure within the range 3 to 15 p.s.i., which, in turn, actuates a pressure-responsive indicator, recorder or controller. In power stations, however, electrical instrument transmission is generally preferred, since it has a number of obvious advantages. This is particularly so where pulverised solid fuel is used, as dust particles and moisture which enter the pneumatic instrument systems can easily result in trouble in flapper-nozzle assemblies.

There are a variety of electrical telemetering systems, from which to choose, and these almost invariably employ low-efficiency transducers (i.e. those with a low energy output), the signals from which require amplification before they can be used. Simple non-electronic systems, where available, such as those employing resistive elements with sliding contacts, do not always meet present-day requirements of accuracy and reliability.

New manufacturing techniques and the availability of new magnetic powder materials in the range known as "Gecalloy," have made possible the production of electromagnetic transducers of a comparatively high efficiency, which provide sufficient power to operate indicators, recorders and controllers directly without intermediate amplification. A system using electromagnetic transducers is attractive for use in power stations since, as it requires no electronic techniques and, in its simplest form, comprises only a sensing head and an indicator, it needs no highly skilled servicing. Furthermore, the system possesses inherently wide supply voltage and frequency independence. The equipment operates directly from a standard a.c. mains supply, which, with certain types of indicator and recorder, can vary in voltage up to ±15 per cent, and in frequency up to ±7 per cent without significantly impairing the accuracy.

Electromagnetic transducers provide robust electrical counterparts of standard mechanical instruments for the measurement of such quantities as mechanical displacement, simple, differential, absolute and compound pressures, liquid level, fluid flow, weight, thrust and tension. In addition, the transducer also enables important measurements to be made, which would be difficult or impracticable with conventional instruments. In some cases, these measurements result in considerable savings in maintenance costs and out-of-service time.

The applications of the transducer are, of course, by no means limited to power stations, and it is, in fact, finding an increasingly useful place in industrial plant generally.

Operating Principles

The construction of a standard mechanical displacement head which forms the basis of most of the electromagnetic transducers, is illustrated in the cut-away model, Fig. 1. A stylus, capable of movement along its principal axis, carries a disc of magnetic material. The disc can move in the gap between two "pot" cores of Gecalloy compressed powder material, each of which carries one or two windings according to type. The range of stylus displacement is governed by the distance separating the core faces.

The coils, for reasons of stability and in order to obtain the minimum d.c. resistance for a given number

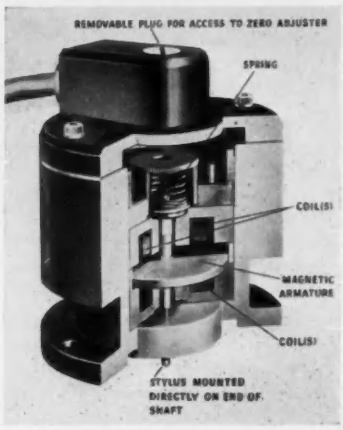


Fig. 1.—Cut-away section of mechanical displacement transducer

* Salford Electrical Instruments, Ltd.

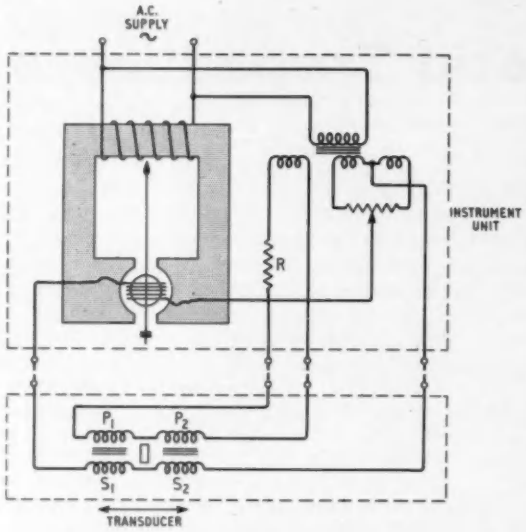


Fig. 2.—Schematic circuit of differential transformer transducer

of turns in the winding space available, are usually formerless.

Two basic electrical arrangements are used. These are shown schematically in Figs. 2 and 3.

In Fig. 2 the transducer comprises a transformer with a variable air gap and differentially connected secondary windings. The transducer primary windings are energised via a step-down transformer from the a.c. mains through a resistor R. With the transducer armature in its mid-position the equal induced voltages in the two secondary windings, which are connected in opposition, together give a zero output. Displacement of the armature from its mid-position results in an unbalance of the secondary currents. The magnitude and sense of the electrical output is then directly related to the movement of the armature.

The differential inductance transducer (Fig. 3) employs two single coils and these are connected to form adjacent arms of an a.c. bridge circuit. A change in armature position results in a proportional change of inductance, giving an out-of-balance current variation which again is related in magnitude and sense to the armature position.

In place of the conventional d.c. instrument with rectifier, the output is measured by a special moving coil dynamometer instrument which uses an a.c. energised wound field, in place of the more usual permanent magnet. Current to the moving coil is fed through very light coil springs, since these have negligible mechanical torque, which is sufficient only to return the pointer to zero when the equipment is switched off. One effect of the a.c. magnetic field is to induce an e.m.f. in the moving coil, the magnitude and sense of which is determined by the direction and degree of rotation of the coil from its position when the pointer is at mid-scale.

From the foregoing, it will be seen that the dynamometer is an integral part of the circuit, being a form of variable transformer. The output voltages of both the transducer and instrument are combined in such a way as to produce a large circulating current in the instrument moving coil. This current interacting with the alternating field flux produces a large torque, of as much as ten times that of conventional rectifier voltmeter systems. The magnitude of this torque is dependent on the deviation of the pointer from the reading position, corresponding to a particular setting of the transducer armature. This torque is in such a direction as to restore the pointer to its true reading position, at which point the torque becomes zero.

If the circuit is again unbalanced by a further movement of the armature, a torque will again be exerted on the movement, the magnitude and sense of which will be to bring the pointer to a new reading position, at which point the torque will again fall to zero. The system is a form of balanced electromagnetic servo-mechanism and since it is dependent mainly on vector relationships, it is substantially independent of normal supply voltage and frequency variations.

Whilst the circuit arrangements are attractively simple, the vector relationships of the currents in the various parts of the circuits are somewhat complex, and their detailed consideration is outside the scope of this article. The two circuits are discussed more fully and a vector analysis given elsewhere.[1,2]

Mechanical Displacement

For the measurement of small mechanical displacements in the ranges 0-±0·01in to 0-0·4in differential inductance heads are generally used, and for low ranges of the order of ±0-0·002in f.s.d., a differential transformer is employed. There is a magnetic attraction on the armature apparent at the extremes of travel, and to overcome this, and to enable the stylus to follow a moving surface without being directly attached to it, a coil spring is fitted in the top of the head which exerts a thrust of about 4 oz on the armature spindle (Fig. 1). Low-friction bearings are incorporated in the standard head, but where high mechanical stability is required, both the restoring spring and the bearings are omitted and the armature is suspended by means of two light beryllium-copper "spider" springs. A removable cap at the top of the head case permits access to a mechanical zero adjuster, by means of which the stylus can be positioned relative to the armature.

The applications of mechanical displacement transducers are numerous, but among the most important in power station work are strain gauging, thermal expansion

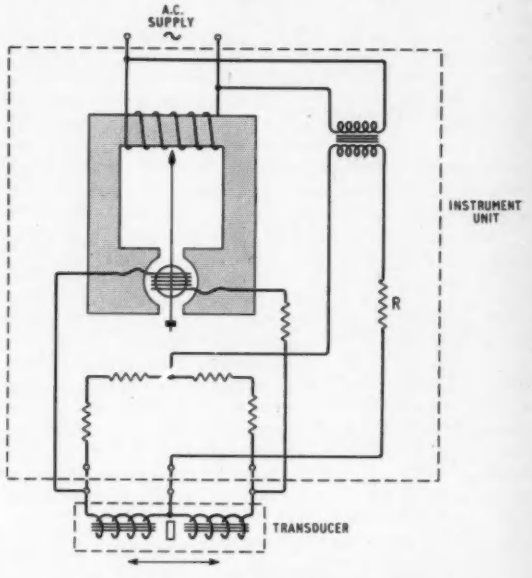


Fig. 3.—Schematic circuit of differential inductance transducer

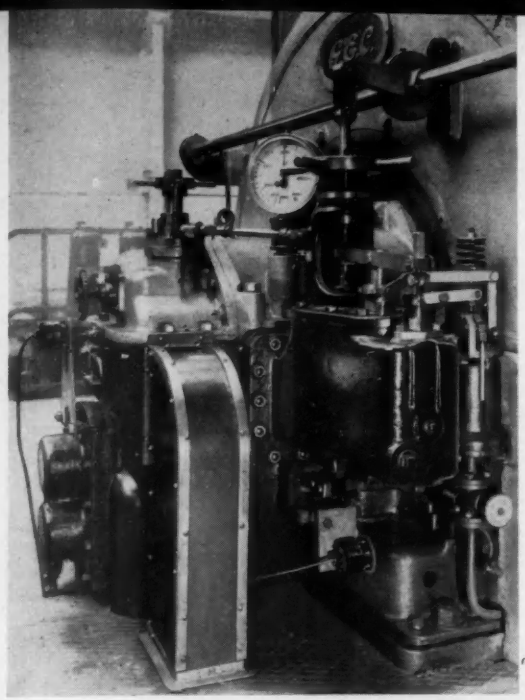


Fig. 4.—Two transducers arranged for the measurement of axial expansion of the shaft and bearing pedestal movement on a turbo-alternator

measurements, pressure testing, and the measurement of creep. One effective use of mechanical displacement transducers is their application in supervisory equipment for the quick starting of steam turbines. These machines, especially those of large capacity, take a considerable time to run up before they are ready for loading. This is due to the need for avoiding mechanical damage as a result of temporary distortions and disturbances which the turbine may undergo.

The expansions of interest include axial differential expansion of the shaft with respect to the casing of both high and low pressure units, and the movement of the bearing pedestals. A typical installation is illustrated in Figs. 4 and 5. The turbo-generator shown is a 30 MW G.E.C. set, and two transducers have been used. One (on the right in Fig. 4) is mounted on a bracket attached to the turbine casing so that the measuring stylus bears directly on the pedestal supporting the turbine. When the temperature of the casing rises and it expands, the body of the measuring head, which is attached to the casing, moves longitudinally away from the pedestal. However, the spring-loaded stylus continues to bear against the pedestal and the transducer output is reproduced as an instrument reading, or a recording, on the control panel (Fig. 5).

The other transducer measuring head is mounted on the end of the casing so that the stylus is moved by the end of the turbine shaft. It therefore records the differential axial expansion of the shaft in relation to the casing. A standard type of head is used for the pedestal, but shaft measurements call for an armature assembly which can be directly attached to and rotate with the shaft.

Mechanical displacement transducers can be used for the indication of load by the measurement of strain. Hopper and tank contents can sometimes be measured in this manner, where a member of the supporting structure, such as a girder or a sheet metal plate, has adequate elasticity and has a suitable amplitude of movement. In such instances, a standard transducer is mounted on an independent rigid support with the stylus in contact with the actuating member. Such an arrangement is, as a rule, useful for approximations only, as temperature, hysteresis, and other effects have to be taken into account.

Pressure vessels can usefully be tested using transducers for strain and pressure measurement as remote indication is often desirable (Fig. 6). Where a radius of curvature measurement only is required, a spherometer type transducer is employed; this head has one adjustable and two fixed feet for support. This type of transducer is used extensively on the flexible walls of the new R.A.E. 8ft supersonic wind tunnel at Bedford.

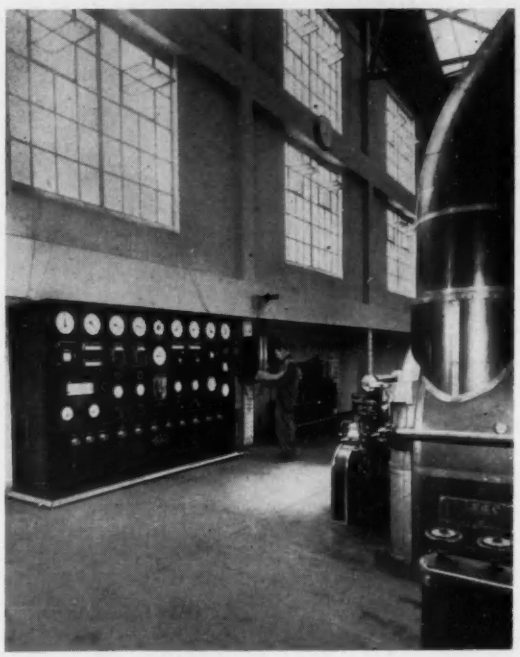
Pressure Transducers

With the increase in steam pressures in power stations, it is now generally considered undesirable to have long lengths of high pressure tubing connecting conventional mechanical pressure gauges on the control panels to distant pressure tappings, and current specifications usually call for some form of telemetering for the remote indication of these pressures. Electromagnetic pressure transducers provide an elegant solution to this problem.

Metallic or other diaphragms and Bourdon tubes can be suitably designed to actuate the styli of mechanical displacement transducers. In conventional gauges, the small movements of the pressure elements are amplified mechanically with delicate lever or geared mechanisms to rotate a pointer, but with a suitable transducer mechanical movement amplification is unnecessary. Thus, a much more robust device is possible. Simple as it may appear to connect a pressure-sensitive element to a transducer, considerable development work has been carried out to overcome the many difficulties encountered and to determine the best design arrangement to suit quantity production and to facilitate service in the field.

In simple low-pressure measurements in the water-manometer ranges, with few exceptions, a diaphragm of some sort is used (see Fig. 7). This may be made from

Fig. 5.—The associated instrument panel



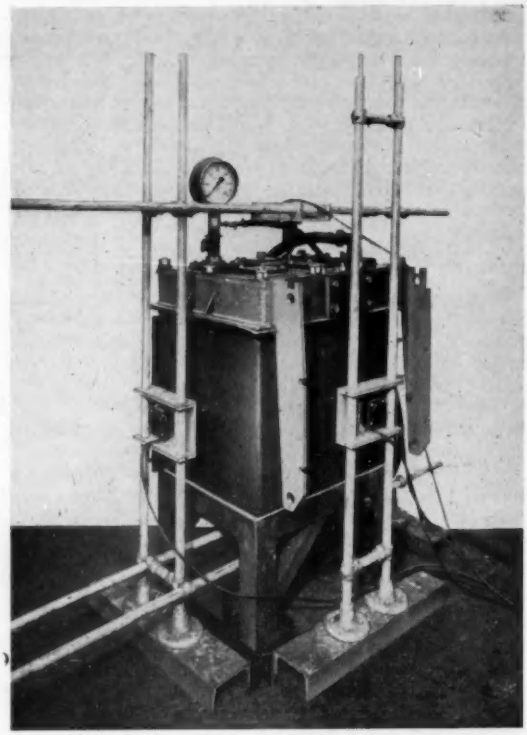


Fig. 6.—Transducers arranged to detect strain in transformer tank during pressure tests

a variety of materials, such as plastics, skins, and metals, according to the pressure range and type of application. Pressures up to 200 p.s.i. or more can be measured in this type of head and its construction permits effective erosion and corrosion protection. High-pressure overloads can often be accommodated without permanent damage to the diaphragm by taking suitable precautions during manufacture, including accurate profiling of the diaphragm housing.

Since open-type diaphragm transducers do not clog they are invaluable for installation on pipelines or on tanks containing heavy fuel oil and slurries (Fig. 8). One type is arranged so that the diaphragm actually projects into the fluid. Spring diaphragms are usually fabricated from beryllium-copper, and, where necessary, protected by plastic or rubber membranes. Beryllium-copper is chosen because it has a number of highly-commendable properties including controllability during manufacture and high limits of elasticity and endurance. The fatigue limit is twice as high as that of phosphor-bronze.

Pressure element manufacture has to be closely supervised so that the requisite characteristics shall be maintained. Close attention to detail during the manufacture of this component is essential to ensure consistent calibration and stability of the transducer when in service for long periods.

For higher pressures, heads employing Bourdon tubes are used (Fig. 9). These tubes are of phosphor-bronze, beryllium-copper, or a high tensile steel, according to the range and application. When chemical protection is required, a hydraulic fluid is used to transmit the pressure to be measured to the transducer. Where necessary, a membrane of plastic or stainless steel separates the hydraulic medium from the main pressure system.[3]

It is normal practice in power stations to provide indicating instruments for continuous monitoring, and where more than one instrument is required in different locations, slave instruments controlled by a master instrument are installed.

Continuous circular or strip chart recording is possible, either by using moving-coil pen-arm direct-writing instruments, potentiometric instruments or special forms of self-balancing electrical recorders. Similarly, proportional, two- or three-term controllers can be used, but for simple on-off control or for providing alarm circuits, it is necessary only to use a dynamometer relay which has two adjustable contact arms (Fig. 10). This is, in effect, a small dynamometer instrument having sufficient torque to operate either of two pairs of control contacts. The unit contains built-in relays which will handle up to 10 A at 250 V. For data reduction systems, which require a digital input, an analogue-digital convertor is necessary in order to accept the output from an electromagnetic transducer.

Differential Pressure and Flow

For the measurement of differential pressures, special transducers have been developed having unique features. The full possibilities offered by the electromagnetic principle have been explored, with the result that a head has been designed in which the conventional mechanical transmission of the diaphragm movement through the pressure housing via a torque tube, metal bellows, or gland, has been avoided. Thus, a mechanically unsatisfactory feature and an inherently weak point in the head have been eliminated, and the fault liability is reduced to the minimum.

The principal features of the differential pressure transducer are that it is capable of operating on small differential pressures at high static pressures, and in many instances it can be made to withstand very high overloads in either direction without permanent damage.

The device which is shown in section in Fig. 11 normally employs a metallic, pressure-responsive diaphragm clamped between two steel flanges, which, like those of the simple pressure transducer, are individually profiled. Attached to the centre of the diaphragm is a spindle which carries a magnetic armature that moves between two fixed pole pieces. The position of the armature, with reference to the pole pieces, is determined electromagnetically through the walls of a pressure-tight Inconel tube. The Inconel tube thus provides a sealed barrier between the fluid under pressure on both sides of the diaphragm, and the electrical components of the head.

Differential pressure transducers are extremely useful for fluid flow measurements at high static pressures. For this purpose, an orifice or venturi flow line unit is provided.

Fig. 7.—Flange mounted diaphragm pressure transducer

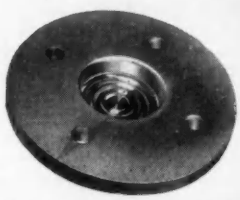


Fig. 8.—Underside of flange mounted transducer, showing diaphragm

The scale shape of the indicating instrument is approximately proportional to the square of the flow rate.

Weight, Load and Torque

A variety of mechanical spring and hydraulic type load cells fitted with appropriate transducers can be provided for the measurement of tension, thrust and weight, and usually these have to be engineered to suit the application. The operating range may be from a few pounds to 2,000 tons.

One recent interesting development in connection with the weighing of large hoppers includes the provision of adjustable on-off control to an accuracy of the order of ±0·1 per cent. As the outputs of the differential transformer transducers can be summated comparatively simply, a container can be mounted on, say, four or six transducer load sensing supports, to avoid errors due to uneven distribution of the contents. Whilst large hoppers are weighed using this technique, transducers are also being used for weighing small trucks, and in this the application is equally successful.

Liquid Level

Levels in fuel oil and water tanks can often be indicated conveniently by measuring the hydrostatic head with a pressure transducer. This avoids the use of inconvenient floats and the equipment is normally very easy to install. If the tank level pressure is other than atmospheric, the differential pressure transducer can be used successfully both on positive head pressures and on vacuum. The high-pressure union is connected to the bottom of the tank or to a suitable point in the plumbing, whilst the low-pressure union connects to the top of the tank to provide pressure compensation.

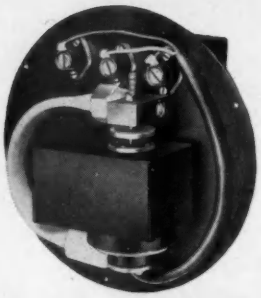


Fig. 9.—Interior of Bourdon tube pressure transducer

In cases where river or reservoir levels are to be measured, the displacer element is the most convenient, since the level sensing rod is simply suspended in the water from a load cell transducer; the apparent change in weight of the rod with change in water level is registered by the transducer. Where a constant water level difference is required as in hydro-electric stations, the differential pressure transducer can be sometimes used to advantage. Tanks containing highly corrosive liquids are best weighed on transducer load cells to ascertain their contents.

Sometimes transducers can be so applied that the annual saving in power station maintenance and out-of-service costs dwarfs the initial cost of installation to insignificance.

It had been established at the Portsmouth C.E.G.B. generating station that tube erosion in the high-pressure feed water heaters was closely bound up with the velocity of the feed water through the heater tubes. Any increase in designed velocity rapidly eroded these tubes, and after a burst tube had resulted on one heater, the thinning of tube walls was confirmed by measurement with a "Probolog."[4]

The condensate from each of the four 30 MW turbo-alternators is metered, but it is then discharged into a common feed suction range. Normally, with all machines at nominal full load there are four pumps in service

Fig. 11.—Sectional drawing of differential pressure transducer

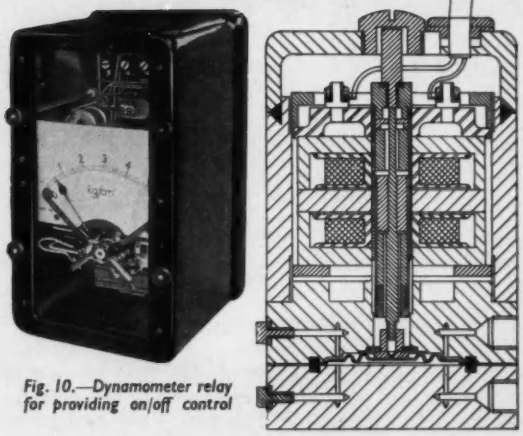


Fig. 10.—Dynamometer relay for providing on/off control

to deliver the feed through the heaters to the boilers as shown in Fig. 12.

The amount of water pumped through each set of feed heaters varies with the conditions obtaining at any time. For instance, only eight of the nine boilers are steaming for full load and the physical position of the spare boiler alters the feed flow distribution. Similarly, each feed pump is duplicated and as its output is dependent on the pump characteristic, so again the feed flow is varied if pumps are changed over. The flow of feed water through the heaters can be controlled by inlet valves and it was considered that some simple flow indicating device should be installed to enable local adjustments to be made on these valves.

The S.E.I. transducer was selected in an attempt to solve this problem with the minimum of operational loss of plant whilst being installed. Vent valves were already fitted on the tops of the loops between the feed heaters and provided convenient points at which to break into the high-pressure lines.

By coupling the inlet and outlet bends of one heater to a differential pressure transducer the pressure drop across the heater was indicated under varying loads.

The relationship between these indicated pressure differences and the quantity of feed water flowing was

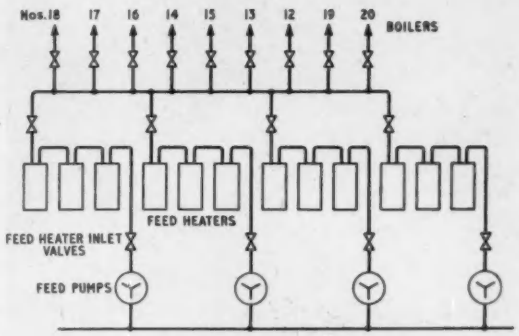


Fig. 12.—Flow diagram of feed water heater circuit at Portsmouth power station

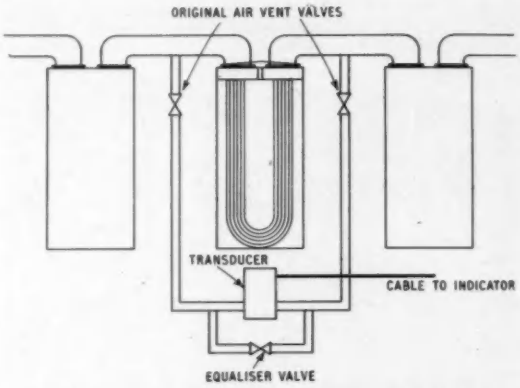


Fig. 13.—Diagram of transducer connected across feed heater

determined by isolating a unit of plant from the rest of the station and observing simultaneously the pressure difference and condensate delivered to the feed pump suction range at varying loads. A calibration chart was compiled and attached to the pressure difference indicator to enable the turbine operator to interpret pressure in terms of load on his machine. A simple schematic diagram of the installation on one unit is given in Fig. 13. This set-up proved successful and a second transducer was therefore installed. To complete the facilities a further two transducers with change-over indicator have recently been installed. Figs. 14 and 15 are photographs of the installation at Portsmouth.

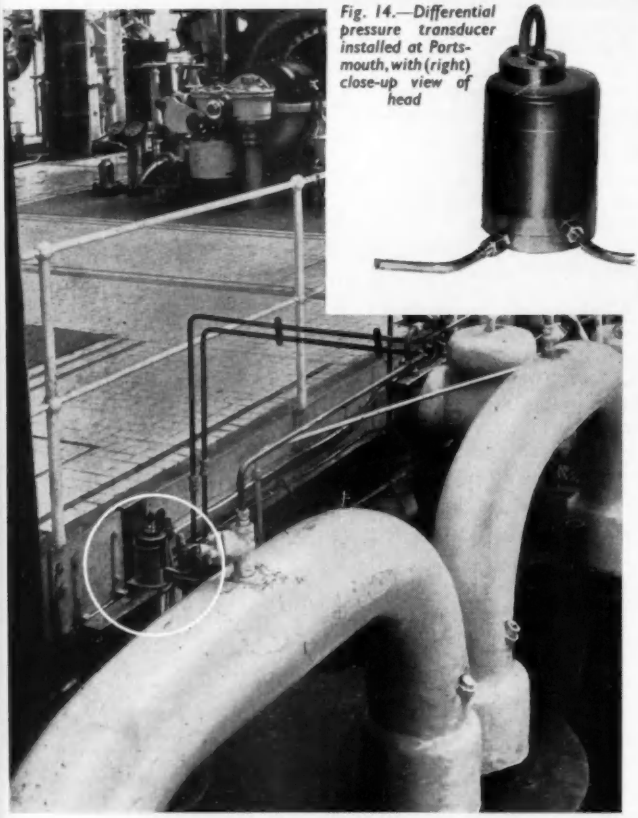


Fig. 14.—Differential pressure transducer installed at Portsmouth, with (right) close-up view of head

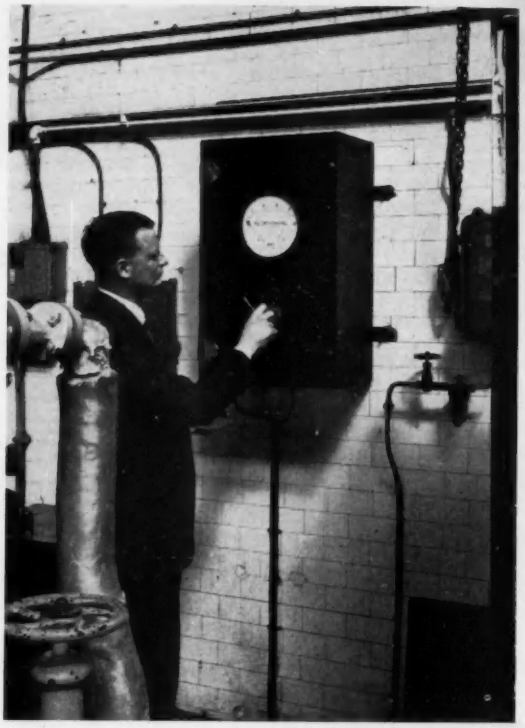


Fig. 15.—Dynamometer instrument for indicating feed water heater differential pressure

Nuclear Power Station Requirements

In addition to the usual pressure, level and flow measuring instruments for use on the steam side, there are a number of special needs for reliable transducers in atomic generating stations, and for the research work associated with their design. New types for use in regions of high temperature and of considerable radioactivity are under development, particularly for the indication of mechanical displacement. The electromagnetic type appears to have great possibilities in this field. New types of recorder and circular scale instruments are also being designed. It is envisaged that a considerable proportion of the instrument requirements for the power stations of the future will be met effectively with the instrument system described.

The author wishes to express his thanks to the operations superintendent, C.E.G.B. generating station, Portsmouth, for the description of his transducer installation, and to colleagues at Salford Electrical Instruments, Ltd., and the General Electric Co., Ltd., for their help in the preparation of this article. Some of the apparatus described is the subject of various British and foreign patents and patent applications.

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VIEWS on the NEWS

By REFLECTOR

ELECTRICITY plays a very significant part in modern social and family life; its absence may have an even greater impact. The *Daily Sketch* has found a family that is being broken up because they cannot have electricity. The eldest son has left home to join the Navy to get away from his gaslit surroundings; another son spends all his evenings looking at neighbours' television. It is said that the family have tried for nine years to get electricity installed, but the local Council says that they cannot have it because the house is requisitioned property —which seems to me a strange excuse, for surely any acquirers would want electricity.

* * *

Co-operation between the electricity and gas industries forms the subject of a study now being carried out by a Ministry of Power committee. In the meantime there seems to be some sort of co-operation in the Stafford area for the *Staffordshire Weekly Sentinel* reports that

> "Meaford P.S.C. wiped out the memory of last week's heavy defeat by slaughtering Gas and Electric by seven goals to one in a Stafford Amateur League match."

If, as is possible, "P.S.C." means "Power Station Club" the position is rather more complicated.

* * *

Sir Harold Smith, chairman of the Gas Council, addressing members of the Wales Gas Consultative Council recently touched upon the subject of gas-electric co-operation. I am surprised that he stated (as reported by the *Western Mail*) that the Gas Consultative Council had said it would not be beneficial while the South Wales Electricity Consultative Council had said there might be considerably more co-operation between the two services. Rather charmingly, the next day the two Councils met to discuss the subject at the Temple of Peace, Cardiff.

* * *

Remembering the recent discussions on the methods adopted by the E.T.U. in choosing its officials, I rather appreciate a misprint in *The Times* of 17th October (in a report on the Shell site dispute) which made it the *Electoral* Trades Union.

* * *

There are constant complaints by electricity consumers of the comparative inaccessibility of their prepayment meters. The subject came up at a recent meeting of the Eastbourne Home Safety Committee when these difficult-to-get-at meters were said to be a fruitful source of accidents—people falling off chairs, etc. The *Eastbourne Herald Chronicle* says that it was reported at the meeting that the South Eastern Electricity Board, while pointing out that the cost of moving the meters would have to be met by the owners or occupiers, was willing to carry out the work at cost price. The Committee thought that the best way out of the difficulty was for consumers to ask the Board to replace the prepayment meters by "quarterly" ones. And let the meter readers incur the accidents, I presume.

* * *

I note that in his address as chairman of the I.E.E. Western Centre Mr. R. W. Steel said:—

> "I like to think of the steel pylons as knights in armour, who are striding across the countryside to fight for a very much higher standard of living for us all."

This is a fresh way of looking at them. Nowadays they seem to be regarded as the modern equivalent of windmills by our Don Quixotes.

* * *

Two contemporary items have caught my attention. One, from the *Shields Evening News*, is that "the electricity bills at Tynemouth Bathing Pool have been 'substantially increased' because of faulty wiring resulting in leakages." The other is a headline in the Manchester *Evening Chronicle*: "New baths to be all-electric." Mercifully, the leakages in the first case were in the dressing rooms (not the baths) although that sounds pretty bad. The second item relates, presumably, to the heating of the water, as well as other electrical services, and not to the baths as such.

* * *

A Press inspection of the Deptford power station of the London Electric Supply Corporation, then in course of construction, was reported in the *Electrical Review* of 26th October, 1888. In this it was said that it was the intention of the directors "to provide lines and machinery capable of running two millions of lamps in the future." Mr. (later Dr.) S. Z. de Ferranti addressed the visitors and described some of his innovations. The report concluded:—

> "The whole of the station, both architecturally and mechanically, has been designed by Mr. Ferranti personally, and the numerous novelties which are being introduced into it are fully covered by a large number of his patents. The first two Ferranti patent dynamos of 1,500 h.p. each are nearly completed, and will shortly be erected; and two dynamos of 10,000 h.p. each will be completed in about five months. Mr. Ferranti, in designing the station and its details on the above principle, has a space at his disposal, now covered with buildings, capable of accommodating 40,000 h.p., and remaining space of ground, easily available without crowding, for another 80,000 h.p. This brings up the capacity of the three acres of ground, after everything has been provided for, to the enormous figure of 120,000 h.p."

An All-Electric Bungalow

Electric floor-heating was originally thought to be unsuitable from the economic and operational aspects but after careful investigation it was found to compare favourably with other forms of heating and was finally adopted. The main heating, lighting and power supplies to the building are controlled by miniature circuit-breakers with earth-leakage protection

By R. I. ELLARBY, A.M.I.E.E.*

THE building to be described was erected in Buckfast, Devon, on a reasonably level site near to main water, drainage and electricity. One requirement in choosing the site was that the land should be well-drained. This was a feature which later favoured the final choice of heating, as it reduces the floor heat losses.

Construction

During the early planning stage, an all-electric bungalow with continuous whole-house heating was decided upon, although the actual form of heating was not then settled. Thus one of the main requirements of the construction was good thermal insulation. This was obtained at relatively little extra cost in the manner described in a previous article,† and summarised below.

The roof and ceiling structure was given special attention as this is often a major source of heat loss. The construction used consists of a pitched roof of tile on battens, on bituminous felt, with a ceiling of plaster lath and a setting coat of plaster. Additional insulation is provided by 2in to 3in of vermiculite loose-fill between the ceiling joists and a 1in fibreglass quilt over them, forming closed air spaces between the joists. The final "U" factor or thermal transmittance (B.Th.U/sq ft/hr/deg F) is 0·1, compared with 0·43 without the additional insulation, at an extra cost of approximately 8s/sq yd.

The sealed-cavity walls are plastered inside and rendered outside, and are formed entirely of six-cell, hollow-clay building blocks, which are also used for all internal walls. In addition to providing good insulation, these blocks considerably shorten the drying-out period due to their reduced water absorption during construction. The final "U" factor is 0·16 compared with 0·3 using standard brick, at no extra cost.

The solid floors consist of a 4in layer of 2in clean stone hardcore, 3in of concrete, a waterproof membrane, and a 2in dense concrete screed. Beneath and around the edges of this slab is a layer of 1in bitumen-bonded fibreglass to reduce downward and edgewise heat losses. The floor finish is lino in kitchen and bathroom, and close carpeting in bedrooms. The living-room and hall will have $\frac{3}{16}$in cork tiles, but the laying of these has been delayed to allow the floor to dry out. The final "U" factor is about 0·1 compared with 0·4 for a suspended wood floor, at an approximately equivalent finished cost.

The windows are single-glazed, galvanised steel, which have a "U" factor of 1·0, thus allowing considerable heat leakage. Internal units will eventually be fitted consisting of glazed, moulded-plastic sub-frames clamped inside the main frames, on felt sealing strips; closed box pelmets and heavy curtains have already been fitted, and these measures will give a "U" factor of about 0·6 at night and 0·7 in the day-time (Fig. 1).

Although an all-electric bungalow was planned, a chimney was included for architectural reasons and forms a leading feature of the

* Consulting Engineer. † "Building Construction and Space Heating," *Electrical Review*, 3rd October, 1958.

Fig. 1.—Part of living room showing 1½ kW "Berrylog" imitation log fire

Fig. 2.—Installation of floor-warming system showing double circuit and use of adjustable loop to simplify the dispersal of a given length of cable

external design, being massively constructed in local stone. The flue was formed in the usual way but was partially sealed both top and bottom, a ventilator being fitted at the bottom so as to provide adjustable room ventilation.

The fireplace itself is also constructed of local stone, being the inside of the base of the chimney, and the hearth was designed to accommodate a " Berrylog " imitation log fire (Fig. 1).

Electric Heating

General.—Electric heating had been decided upon since " whole-house " heating was required and the capital cost of any form of central heating using piped water, whether solid fuel, oil or electrically heated, would be high. Sheltered accommodation would also be required for the equipment.

Separate appliance heating, using convectors, radiators or tubular heaters, was considered, but the safety aspects as regards children and fire, together with the space factor and the cost of £16 to £20 per installed appliance, were decided disadvantages. In addition, such heaters are creators of draughts and at the same time the distribution of heat from them is subject to control or interference by air currents.

Electric floor-warming, originally favoured but then discarded owing to the aura of uncertainty and expense surrounding the operational results and costs, was more closely investigated and finally adopted. The initial cost was found to compare favourably with the total cost of separate electrical appliances, and to be very much less than for any other form of general heating. The calculated running costs were also found to be lower than for separate appliances, for a comparable degree of comfort, due to the availability of off-peak tariffs for floor-warming.

Further well-recognised advantages of floor-warming include:—

(a) Labour saving, due to automatic operation.

(b) Space saving, as all equipment, except the thermostats, is concealed, thus enabling full use to be made of all wall and floor space.

(c) Increased comfort, as the air temperature gradient from floor to ceiling is much more satisfactory than with high temperature radiators and convectors.

(d) Decoration economy, as pattern-staining is largely due to air currents sweeping across cold surfaces, causing surface temperature variations to show up as patterns. This tendency is considerably reduced as less severe convection currents are caused by floor warming, which, together with improved insulation, also eliminates cold surfaces.

Therefore, in view of the many advantages, floor-warming was adopted, despite the slight element of operational uncertainty.

Choice of System

The various systems available can be said to form two main groups:—

(1) Withdrawable, in which the heating elements can be easily replaced in the event of a failure,

(2) Embedded, in which the heating element is laid direct in the floor concrete and would be difficult to replace.

System (2) is cheaper to install, yet, once correctly laid, the cables are designed to last as long as the building. The cost per installed kilowatt for either system varies according to maker, scale and design of the installation. For the bungalow in question, quotations for system (1) ranged from £17 to £25 per kilowatt, and for (2) from £10 to £15 per kilowatt. The " Calidec " embedded system was finally chosen at a cost of £80, or £13 per kilowatt, including all control gear.

The " Calidec " system consists of a p.v.c. insulated, stranded high tensile steel heating cable laid in a continuous grid over the whole warmed area of the floor (Fig. 2) and covered by the concrete screed. The cables can be obtained in various lengths and loadings, each length being supplied ready terminated with copper " cold " leads of a length suitable for connection to thermostats, etc., without further jointing out. The factory-made joints are pressure made, sealed and tested. Cable anchoring discs are also available for fastening the end loops of the cable grid pending the pouring the screed (see Fig. 2).

Thermostats.—There are many types of wall-mounting thermostat available, but the author decided that a heating installation fed from a separate ring main, each circuit being separately switched and fused at the thermostat, would best satisfy the requirements of simplicity and safety. One fault would not then trip out the whole system and each circuit could be controlled independently. The only thermostat known to fulfil all these require-

TABLE I.—HEAT LOSS AND LOADING TABLE

"U" =	0·1		0·16		1·0		0·1		0·02 B.Th.U./°F/cu ft Air Change		Total Loss		kW Reqd.			Cable	
	Floor		Walls		Windows		Ceiling										
Room	Area sq ft	Loss B.Th.U./°F/hr	Area sq ft	Loss B.Th.U./°F/hr	Area sq ft	Loss B.Th.U./°F/hr	Area sq ft	Loss B.Th.U./°F/hr	Vol. cu ft	Loss B.Th.U./°F/hr	B.Th.U./°F/hr	B.Th.U./hr	Calc.	@ 10W/sq ft	kW Inst.	Length ft	Spacing in
L.R. ...	250	25	266	42·5	90	90	250	25	2,000	40	223	6,250	1·86	2·5	2·6	460 460 310	2·2 2·2 2·2
B.1 ...	100	10	66	10·4	38	38	100	10	800	16	84	2,350	0·69	1·0	1·0	460	2½
B.2 ...	100	10	239	38·2	27	27	100	10	800	16	101	2,830	0·83	1·0	1·0	460	2½
Hall ...	50	5	—	—	20	20	50	5	400	8	38	1,060	0·31	0·5	0·6	310	2½
Bath ...	45	4·5	97	15·5	12	12	45	4·5	360	7·2	44	1,230	0·36	0·45	0·46	215	2·1
Kitchen	65	6·5	32	5·1	24	24	65	6·5	520	10·4	53	1,480	0·44	0·65	0·45	205	2
Total ...	610	61	700	112	211	211	610	61	4,880	98	543	15,200	4·49	6·1	6·1	—	—

ments is a Kieft type A55. This is compact, it incorporates a 13 A fuse and a neon indicator light, it has an "off" position, and is of all-insulated construction (see Fig. 3).

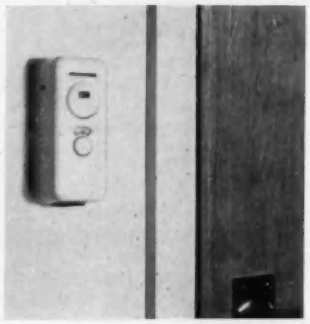


Fig. 3.—Kieft thermostat

Layout.—Table 1 gives the results of the heat loss and loading calculations based on 28 deg F rise, giving 60 deg F throughout with an external temperature of 32 deg F. It includes area, losses, loadings, cable lengths and spacings. It will be seen that the installed loadings agree closely with the general recommendations of 10 watts per sq ft of warmed area, and the results show that there is a margin of input over losses to allow off-peak heat storage.

To allow individual control of different areas so as to provide maximum comfort and economy, there are four circuits connected to a ring main, each circuit being controlled by its own thermostat mounted 5ft 6in from the floor.

Living Room and Hall.—This circuit is expected to have a longer heating season than the remaining circuits, as a little heat here at each end of the heating season will provide comfort throughout the building. It is further divided into four sub-circuits, one in the hall and three in the living room, all controlled by one thermostat. This is a precaution against the remote possibility of cable failure, as one faulty cable cannot now deprive this important area of all its heating.

Bedrooms.—Each bedroom has a separate circuit and thermostat so that in the event of sickness or disuse, the temperature of each room can be adjusted accordingly.

Kitchen and Bathroom.—These are controlled by one thermostat but have three sub-circuits divided between them, not only as a precaution against cable failure, but to simplify installation.

Installation.—The installation of the cable is very simple and was quickly done as follows:—

(a) The fibreglass floor insulation was laid over the site soil and was turned up vertically upon the internal face of the wall foundations.

(b) The hard core was then laid and covered with concrete, and wood battens were set flush with the surface in predetermined positions.

(c) The cable-anchoring discs were then fixed to the battens at twice the calculated spacings (Fig. 2).

(d) Next came the laying of the cable, which was timed to just precede the screed pouring. Care was taken to see that the cables were not displaced and that the "cold" lead junctions were covered by the screed. The men had been warned against possible damage when covering the cable, but as it is very tough, the greatest risk is from the sharp edges of tools, etc.

(e) Once the screed was poured, all circuits were "Megger" tested to earth as a check against damage, the test being repeated later.

The whole installation was carried out without mishap, and the final test was perfect. The remainder of the installation work followed well-established routine.

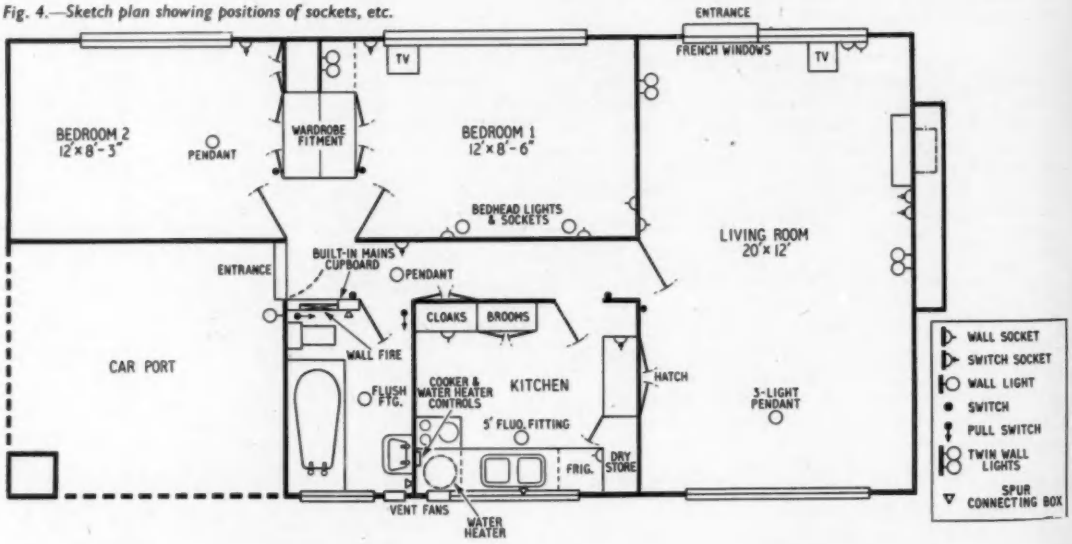
Supplementary Heating.—This was felt to be necessary in the bathroom and living room only. A high level, high temperature electric fire was provided for the bathroom, controlled by a cord switch, and the living room was equipped with a "Berrylog" 1½ kW log fire for topping-up and for use between seasons.

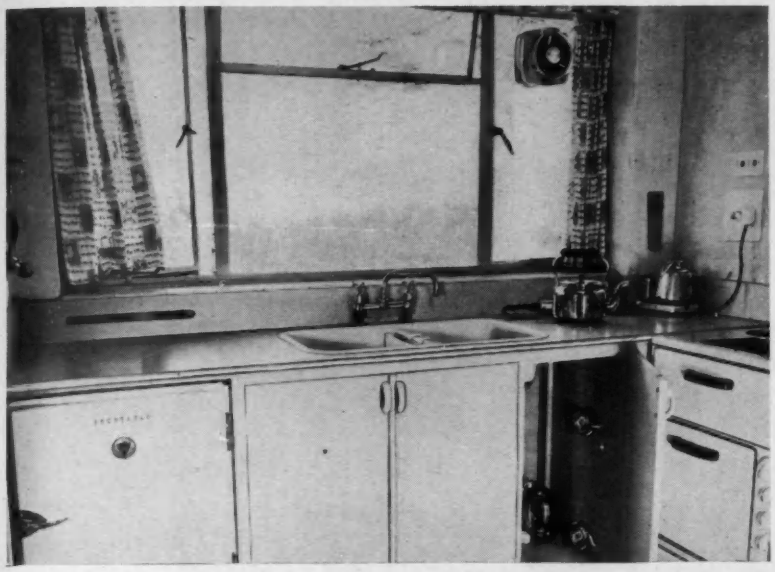
Ring Main Installation.—Previous experience in ill-equipped houses prompted the installation of as many sockets as could be justified, and thirteen 13 A sockets and three 13 A fused spur connecting boxes, all M.K. flush pattern, were connected to a ring main (Fig. 4).

There are two twin-gang units in the living room, one being for TV with a spare for a reading lamp, etc., and the other, which is switched, is for the fire plus a spare (Fig. 1). In addition, there are two single-gang sockets, one opposite the fireplace for general use, and one just inside the serving hatch doors for use with a toaster or hot-plate, etc., or for general use in either kitchen or living room.

No. 1 bedroom has two main sockets, one for the bed-head fitting on which are also mounted a bed light and a

Fig. 4.—Sketch plan showing positions of sockets, etc.





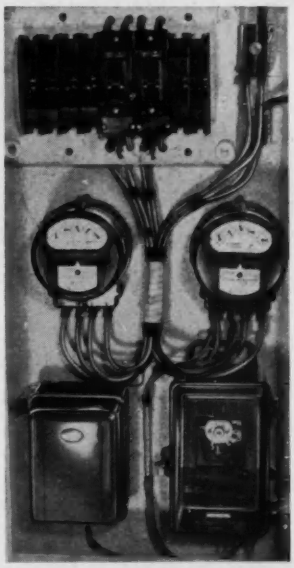


Fig. 5 (left).—Sink unit showing built-in refrigerator and water heater, and M.K. control units for cooker and water heater. Fig. 6.—Built-in mains cupboard showing e.l.c.b.'s, m.c.b.'s, time switch, contactor and supply meters

socket at each side, the bed sockets being for electric alarm clock, blanket, automatic teamaker, etc. The second main socket, which is switched, is near the window and is intended for radio or TV should either be required during sickness, and a TV aerial feeder socket is nearby.

No. 2 bedroom has one switched socket only, for bed-head lights and other possible uses. A switched socket in the hall opposite the bathroom door caters for vacuum cleaning in bedrooms and hall, as well as for any power requirements connected with work on the car in the nearby car port, such as cleaning or polishing.

The bathroom, which cannot have socket connections, has two high level, fused spur boxes, one for an "Xpelair" ventilator fan mounted in the outside wall, and one for the wall-mounted electric fire. Both appliances are controlled by cord pull switches.

The kitchen has four 13 A sockets, two of which are switched for convenience. There is also a fused spur box mounted in the wall above the window to supply an electric clock and a window-mounted ventilator fan (Fig. 5).

Water Heating.—A combination sink unit is fitted having a refrigerator at one end and a water heater at the other (Fig. 5). The water heater is fitted in the corner next to the cooker, in space which would otherwise be of little use because of its inaccessibility.

The heater consists of a 28 gallon copper cylinder fitted with two 3 kW immersion heaters each having a built-in thermostat. One heater is fitted near the bottom of the cylinder, to heat the maximum amount of water. The second is near the top in order to heat only 5 to 6 gallons, for sink use.

All the free space around the cylinder, in the cupboard provided, is filled with fibreglass heat insulation. There is a minimum thickness of 2in at points on the circumference near to the wall and cooker, and a minimum of 4in above the cylinder, in the centre. A baffle was fitted to the cold water feed inlet to the cylinder to prevent incoming cold water from unduly disturbing the stratification of the heated water.

Control of the heater is via an M.K. grid-switch unit mounted flush in the wall above the heater (Fig. 5). This unit incorporates a four-gang insulated plate fitted with two 15 A double-pole switches and two neon indicator inserts. Both heaters are on separate circuits, however, as the bulk water heater is connected to the off-peak supply, and it was felt to be better practice for both safety and convenience, to have the top heater independent of the socket ring main.

Cooker Supply.—This follows normal practice except that a flush, wall mounted M.K. control unit is used, with the cooker tails concealed by running them in the wall to a connecting box behind the cooker. This gives a very neat finish to an otherwise untidy arrangement (Fig. 5).

Lighting.—This again follows normal practice. The living room has a pendant, three-light fitting at one end and two twin wall lights at the other, all controlled via a three-gang M.K. flush grid-switch unit. This provides ample illumination for almost all requirements, and standard or reading lamps can be used to supplement this as required. The only other point perhaps worthy of mention is that no pendant fitting of any kind is provided in No. 1 bedroom. The lighting simply consists of a twin wall light over the built-in dressing table, and twin bed lights. These have been found to give adequate yet restful lighting for all requirements.

Main Supply Unit.—All the mains supply and distribution equipment is fitted in a special cupboard (Fig. 6) forming the lower section of a wall unit, the upper section being the bathroom cupboard and opening from the other side. Down the side of the bathroom cupboard is a cavity provided as a cable duct between the roof space and the mains cupboard.

The equipment includes the supply cut-outs and two meters, one for off-peak supplies and one for normal supplies. The off-peak meter supplies a time switch, a contactor, a Crabtree type E-60 earth leakage circuit-breaker, and two Dorman Smith 30 A miniature circuit-breakers, one for the floor-warming and one for the bottom immersion heater. The normal tariff meter supplies a second E-60 e.l.c.b., which controls four further m.c.b.'s,

one 5 A for lighting, one 15 A for water heating, one 30 A for the socket ring main, and another 30 A for the cooker control unit.

The two Crabtree e.l.c.b.'s are both fitted with overload trip coils and thus perform the dual purpose of earth-leakage protection and main circuit-breakers.

TV Aerial and Feeders.—As signal strength in the area is good, an aerial is mounted in the roof space. Twin, concealed feeders are run to flush wall sockets, one in the living room and one in the bedroom. To avoid difficulty due to mismatch or signal reflection, or to signal absorption, a change-over connection is fitted in a convenient position.

Portable Tools.—Power operated hand tools are almost essential in any garden which is to be maintained with the minimum of time and labour. Electric grass cutters, too, have decided advantages over petrol driven machines, not the least of these being freedom from starting troubles and quietness. The popular ¼in electric drill, with its multitude of accessories, is also extremely useful in a new house, especially where a certain amount of " do-it-yourself " work is contemplated.

Such equipment, however, can be lethal if carelessly or improperly used, especially on a 240 V supply. To reduce such danger, the author's equipment is 110 V and is supplied through a portable, double wound, screened primary, 0·5 kVA transformer, earth protection being by means of a voltage operated e.l.c.b.

Thanks are due to the South Western Electricity Board, R. B. Pullin & Co. (Kieft thermostats) and Calidec, Ltd., for photographs and for information, and to the S.W.E.B. local staff and the electrical contractor, G. H. Farley of Ashburton, for advice and co-operation in the preparation of this article.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Space Heating

THE letter from Mr. A. C. Hazel published in your issue of 10th October last is stimulating, and one reads it with pleasure. It is true, as he says, that in recent years an immense volume of knowledge has been acquired about the heating of buildings, and a variety of methods have been adopted. Some have been successful; others have been less successful owing, often, to the absence of competence, resulting in unsuitable application. It is desirable that all who are interested in this subject should ventilate their information as it is acquired.

Experience shows that requirements in buildings vary so considerably that it is unwise to be dogmatic about heating in general and claim that a particular method is superior to others. It may be in certain circumstances and conditions, but only so.

There is no doubt that situations exist where low-temperature oil-filled electric radiators are ideally suited to the general requirements presented. It must, however, be equally admitted that other situations exist where other forms of heating are more suitable; incidentally, a " tailor-made oil-filled electric radiator " must be frightfully expensive to buy.

I think Mr. Hazel is right in his appeal for detailed information to be provided about comparative running costs. The figure which he gives for low-temperature oil-filled electric radiators appears to me to be low; but then again the conditions and circumstances are not given. Where a prevailing temperature of 65 deg F is required throughout a winter season extending from 1st October to the middle or end of April, one would expect a kilowatt of heating to absorb more than 1,000 kWh. My experience shows that with off-peak thermal storage heaters, a kilowatt will absorb approximately 1,400 kWh under the conditions referred to. If, however, a consumer were satisfied with a prevailing temperature of 60 deg F the consumption would be considerably less.

It is because requirements and conditions vary so enormously that one hesitates to lay down an arbitrary figure which can be given as the one to be taken for a particular installed load, and until more detailed information is available one can only say that the consumption will be " round about " a certain figure.

Mr. Hazel can be assured that detailed information is being acquired, and I have no doubt that as it is collated, the findings will be made known to those who are interested in this absorbing subject.

Elton, Peterborough. L. HOULDRIDGE.

Refrigerators and Home Freezers

YOUR contributor Helen Key (17th October issue) asks why only 12 per cent of householders possess refrigerators. The answer is that the industry has been so eager to sell refrigerators it has omitted to sell refrigeration first. It is no use screaming the advantages of make " X " over make " Y " if the public have not been convinced that they must have a refrigerator of some kind. So far the trade has failed to do more than create an impression that a refrigerator is a desirable luxury, useful for impressing the neighbours and for preventing milk from turning sour.

This could be corrected by (*a*) stressing how much money a refrigerator would save, thus providing wives with a powerful argument and husbands with an excuse; (*b*) giving mouth-watering examples of what can be done with a refrigerator; (*c*) making the public's flesh creep about their germ-filled pantries. After that, give people some idea how to choose a refrigerator for size, where to put it, how to use it. This information is not, I regret to have to correct Helen Key, available from the charming girls in electricity showrooms.

I have no connection with the electrical trade, advertising, or refrigeration.

Marple, Ches. E. GILLIBRAND.

Public Transport Association Dinner

The annual dinner of the Public Transport Association will be held on 13th November at the Connaught Rooms, Great Queen Street, London, W.C.2.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

A. Reyrolle & Co., Ltd., announce that **Sir Claude D. Gibb,** K.B.E., D.Sc., F.R.S., has decided to relinquish the chairmanship but retains his seat on the board. He has made this decision because of his many commitments with the companies associated with C. A. Parsons & Co., Ltd., and A. Reyrolle & Co., Ltd., which have increased in recent years, particularly in the development of industrial nuclear power plant. Sir Claude is at present on a business visit to Canada and the United States. **Mr. H. H. Mullens,** B.Sc., M.I.E.E., managing director, succeeds him as chairman. Mr. Mullens, who was previously chairman of the North Eastern Electricity Board, joined the company in 1954. **Mr. E. N. Robinson,** LL.B., continues as deputy chairman of the board.

In consequence of his retirement from executive duties, **Mr. C. A. Stephens** has resigned his directorships

Sir Claude Gibb

Mr. H. H. Mullens

of the Parolle Electrical Plant Co., Ltd., the British Short-Circuit Testing Station, Ltd., A. Reyrolle & Co. (S.A.) (Pty.), Ltd., and A. Reyrolle & Co. (Rhodesia), Ltd. He remains on the boards of A. Reyrolle & Co., Ltd., J. H. Holmes & Co., Ltd., and Ets. Merlin & Gerin of Grenoble, France. **Mr. J. Bennett** joins the board of the Parolle Electrical Plant Co., Ltd., and **Mr. W. G. Martin** the boards of A. Reyrolle & Co. (S.A.) (Pty.), Ltd., and A. Reyrolle & Co. (Rhodesia), Ltd.

Mr. O. S. Woods, A.M.I.Mech.E., A.M.I.E.E., chief generation engineer (operation) of the East Midlands Division of the Central Electricity Generating Board, has been appointed controller of the East Midlands Division. Mr. Woods was first apprenticed to switchgear manufacturers and then served five years training with the British Thomson-Houston Co., Ltd., at Rugby. In 1934 he took up an appointment at Battersea power station and six years later joined the London Passenger Transport Board as personal technical assistant to the chief engineer, subsequently becoming assistant resident engineer at the Board's Neasden power station. In 1944 he obtained a similar position at the Ironbridge power station of the West Midlands Joint Electricity Authority and later became resident engineer at the Barton power station of the Manchester Corporation Electricity Department. In 1948 Mr. Woods joined the North Western Division of the former British Electricity Authority as generation engineer (operation) and three years later was appointed to the East Midlands Division post which he now relinquishes to become controller.

Mr. O. S. Woods

Mr. G. H. Holding, M.I.Ex., has joined the Electro Dynamic Construction Co., Ltd., as sales manager, in which position he will handle sales for both home and overseas territories. Mr. Holding was educated at Manchester College of Technology and received his training with Ferguson Pailin, Ltd. From 1923 to 1928 he was manager of Long & Crawford, Ltd., and from 1928 to 1934 was works manager for Drake & Gorham, Ltd. He then went to Newman Industries, Ltd., as London manager, and in 1941 became a director of a subsidiary company, Machine Repairs, Ltd. He was appointed London manager of Stewart Thomson & Sons (Liverpool), Ltd., and its associated company, Electric Machinery Co. (Manchester), Ltd., in 1946. Mr. Holding was chairman of the Association of Electrical Machinery Trades for 1951-52.

Early in November **Mr. R. H. Baldwin,** electric motor sales manager of Newman Industries, Ltd., is to make a tour of the Far East. He will visit India, Pakistan, Burma, Thailand, Vietnam, Hong Kong, China and the Federation of Malaya.

Mr. E. A. Davey, Switchgear Tender Engineering Department, Willesden, of the British Thomson-Houston Co., Ltd., has retired after more than forty-six years with the company. After serving an apprenticeship with the Adams Manufacturing Co. (now Igranic Electric Co.) in Bedford, Mr. Davey went to Rugby in 1912 to join the B.T.H. Test Department. Two years later he transferred to the switchgear section in Rugby and in 1915 he moved to Willesden. In 1928 he was made responsible for the factory's main electricity supplies.

Mr. E. A. Davey

From 1934 until 1950 he concentrated on industrial gear, being made responsible in 1936 for switchgear

Members and guests of Fuller Electric, Ltd., at a luncheon held at the Dorchester Hotel to celebrate the company's diamond jubilee (see page 781)

plant in all B.T.H. factories. For the past four years Mr. Davey has been occupied on plant extensions at Larne in Northern Ireland, Newcastle (Staffs.), Thorne, Lincoln and Chesterfield.

Two executive appointments arising from the reorganisation of the Hawker Siddeley Group are announced. **Mr. W. Humble,** group regional executive for the Near East and Pakistan, has been appointed international sales manager for the Aviation Division, and **Mr. M. Clear,** formerly director in charge of exports of the Brush Group, becomes international sales manager for the Industrial Division. Initially, the Industrial Division will comprise the Brush Group's electrical engineering companies (Brush and Fullers) and its oil engine companies (Mirrlees, National, McLaren, Petters and Bryce Berger).

The **Midland Electric Manufacturing Co., Ltd.,** held its sales conference at head office, Tyseley, on 6th and 7th October. To conclude the proceedings, and to mark the fiftieth

Mr. W. J. Barber (chairman and managing director, Midland Electric Manufacturing Co. Ltd.) and Mrs. Barber (on the right) receiving the sales director, Mr. R. W. S. Mackay, and Mrs. Mackay, at the company's jubilee celebration dinner

anniversary year of the company, the sales force joined executive and senior staff for a celebration dinner at Chadwick Manor Hotel, Knowle, Warwickshire.

Mr. S. Elford has been appointed sales manager of Walter Instruments, Ltd., tape recorder division. He joined the company in April of this year and was previously general sales manager of Vidor, Ltd.

The annual dinner-dance of the **I.E.E. Scottish Centre** will be held on 18th November at the Grosvenor Restaurant, Gordon Street, Glasgow. Tickets, 34s each (graduates and students up to the age of 28, 15s each), can be obtained from Mr. J. H. P. de Villiers, hon. secretary of the Scottish Centre, 19, Waterloo Street, Glasgow, C.2. Applications should be made by 10th November.

In our issue of 12th September we reported the retirement from executive duties with the Telegraph Construction Co., Ltd., of **Mr. E. W. Smith,** Ph.D., B.Sc., M.I.E.E. A presentation of a silver tray was made to him recently by his fellow directors, when the accompanying photograph was taken.

Dr. E. W. Smith (left) receiving a presentation, on his retirement from executive duties, from Sir John Dean (chairman of Telcon)

Mr. J. H. Prole has been appointed assistant manager of the Mechanical Handling Division of Babcock & Wilcox, Ltd. He has for many years been closely concerned with the design and supply of the company's ash and dust handling equipment and also, more recently, with the expansion of the Mechanical Handling Division's activities into other fields such as the bulk handling of ore, phosphates and chemical products.

The first Ladies' Night of the **Association of Supervising Electrical Engineers' Golfing Society** was held on Friday last at the Café Royal, London, and proved a great success. About 250 members and guests, with their ladies, were in attendance and the guest of honour was Sir Harold Bishop (president, A.S.E.E.), who was accompanied by Lady Bishop. Speech-making was kept to the minimum and apart from the loyal toast, the only toast of the evening was that to "Our Guests." This was proposed by Mr. W. F. Parker (captain of the A.S.E.E. Golfing Society). The response was made by Sir Harold Bishop. During the dancing which followed the dinner excellent entertainment was presented by Barry Manning's "Champagne Cabaret."

Mr. W. H. Devenish has been appointed deputy head of the Member Relations Department of the Electrical Research Association. He joined the Association in 1938 and since 1947 has been the senior technical secretary responsible for the group of E.R.A. committees concerned with insulating materials.

Mr. W. H. Devenish

Mr. G. A. W. Taylor will now assume this responsibility, but Mr. Devenish will continue to keep in close touch with the work of these committees and to represent the Association on B.S.I. committees concerned with similar subjects, as well as assuming wider responsibilities in regard to the increased effort which the Association is making to improve its personal links with members.

The **Midlands Radio Industry Golfing Society** held its last meeting of the season at Edgbaston Golf Club, Birmingham, on 8th October. This competition was a Stapleford bogey for the Harry Hackett Cup. The winner was Mr. J. T. Aiken and the runner-up Mr. J. Thomas. The annual general meeting followed in the clubhouse. The annual duck supper and presentation of prizes will take place at Edgbaston Golf Club, Birmingham, on 21st November next.

C. A. Parsons & Co., Ltd., announce that **Mr. G. M. Baker,** director, who has for a number of years been chief mechanical engineer, has now been appointed general manager.

Mr. G. M. Baker

Mr. Frank Westerman, of F. Westerman (Wholesale), Ltd., Birmingham, is in hospital recovering from an operation. In the meantime the business is being carried on under Mr. H. E. Bagnall.

Over 400 members were present at the 42nd annual dinner of the **Birmingham Electric Club** which was held at the Grand Hotel on 17th October. Mr. W. S. Lewis, president, was in the chair. The toast of the Club was proposed by the Deputy Mayor of Birmingham, Alderman J. J. Grogan, the president responding. Mr. R. Paterson, who proposed the toast of the guests, said that he was pleased to see the local branch chairman and hon. secretary of the Institution of Mechanical Engineers, since co-operation between elecrical and mechanical engineers was a necessity. Mr. H. J. Randall replied on behalf of the guests and reminded those present that the president was celebrating 50 years in the electrical industry. He went on to

Members and guests at the Birmingham Electric Club dinner. Left to right: Mr. G. F. Peirson (deputy chairman, Midlands Electricity Board), Mr. W. S. Lewis (chairman, M.E.B.), Mr. H. J. Randall (chairman, Enfield Cables, Ltd.), Alderman J. J. Grogan (Deputy Mayor of Birmingham), Mr. J. Ashmore (chairman, I.E.E. South Midland Centre), Mr. E. H. Cox (hon. secretary, I.E.E. South Midland Centre), Mr. R. Paterson (senior vice-president, Birmingham Electric Club), and Mr. J. Clement (immediate past president of the Club)

discuss the results of the nationalisation of the supply industry and concluded by wishing the Club every success.

The board of Associated Electrical Industries, Ltd., has decided to appoint a director of central services, and **Mr. G. E. Walker,** O.B.E., has been elected to the board to fill this appointment. He will continue to be secretary of the company. Mr. Walker joined A.E.I. as assistant secretary in 1946, and was appointed secretary later in the same year.

Mr. G. E. Walker

The Midlands Branch of the **Electrical Trades' Commercial Travellers' Association** held its annual general meeting in Birmingham on 13th October. The retiring branch chairman, Mr. S. LeMarechal, thanked all members and officers for their support during the year. The following officers were elected for 1958-59: chairman, Mr. T. C. Browne; vice-chairman, Mr. P. M. King; hon. secretary, Mr. C. E. Davison; hon. treasurer and charity steward, Mr. G. A. James. The branch annual dinner is being held to-day (Friday) at the Pavilion Suite, The County Ground, Edgbaston, Birmingham.

Mr. D. J. Davis has been appointed sales manager of British Physical Laboratories. Mr. Davis served from 1939 to 1945 in the R.E.M.E. After demobilisation he joined Avo, Ltd., where he has been acting as technical sales engineer. He succeeds **Mr. D. G. A. Davies,** who is taking up an appointment with E.M.I. Electronics, Ltd.

The London Electric Wire Co. & Smiths, Ltd., and its associated companies, Frederick Smith & Co., the Liverpool Electric Cable Co., Ltd., and the Vactite Wire Co., announce a number of staff promotions in the sales organisation. The following appointments have been made with effect from 1st November next:—**Mr. L. N. Smith,** formerly manager of the Leeds branch, becomes assistant sales manager at the Leyton works; **Mr. J. W. Hunter,** branch manager, Newcastle-on-Tyne, takes over the Leeds branch; **Mr. W. B. Jeffrey,** representative in charge of the Edinburgh sub-branch, moves to Newcastle-on-Tyne as manager; and **Mr. C. M. Russell,** representative at the Glasgow branch, becomes representative-in-charge at the Edinburgh sub-branch.

On Wednesday last week **Mr. L. A. Gripper,** M.I.E.E., manager of the Ravensbourne District of the London Electricity Board, retired and to mark the occasion a large gathering of his colleagues in the area, from other areas and from the headquarters of the Board attended a presentation ceremony at Sydenham, when a combined television and radio set and an electric toaster were presented to him by Mr. A. N. Todd, deputy chairman of the Board, on behalf of his many friends. In making the presentation, Mr. Todd outlined Mr. Gripper's career and mentioned that he had served in the industry for forty-eight years. He paid tribute to his work and wished him a long and happy retirement. Tribute was also paid by Mr. S. Eclair-Heath, management officer, South Western District of the Board.

Mr. L. A. Gripper receiving a presentation, on his retirement, from Mr. A. N. Todd

Mr. Gripper served as a pupil with the Blackburn electricity undertaking, and after service in the 1914-18 war, joined the Newcastle-upon-Tyne Electric Supply Co. He subsequently held positions with the English Electric Co., the Northmet Power Co. and the Croydon Corporation before going to Eastbourne in 1933 as deputy borough electrical engineer. In 1938 he was appointed borough electrical engineer

Members of a deputation from Canada, who have been spending three weeks in Britain studying the application of atomic energy to electrical power generation, recently visited Hinkley Point. Left to right: Mr. P. H. W. Wolff (chief reactor engineer, English Electric Co.); Mr. W. R. Wootton (deputy manager, Atomic Energy Department, Babcock & Wilcox, Ltd.); Dr. R. L. Hearn (director, Atomic Energy of Canada, Ltd.); Mr. L. H. Short (general export manager, English Electric Co.); Mr. J. Lorne Gray (chairman, Atomic Energy of Canada, Ltd.); Mr. E. B. Banks (chief commercial manager, English Electric Co.); Mr. H. G. Nelson (managing director, English Electric Co.); Mr. A. J. Hill (managing director, Taylor Woodrow Construction, Ltd.); Mr. J. S. Duncan (chairman, Ontario Hydro Electric Commission); Mr. H. M. Mathews (director of Engineering, English Electric Co.); and Mr. R. Wall (group resident superintendent, Hinkley Point)

at Beckenham and held this position until nationalisation in 1948 when he was appointed engineer of the Southern Sub-Area of the London Electricity Board. With the District reorganisation about fifteen months ago he was appointed manager of the Ravensbourne District.

Mr. Gripper is succeeded as manager of the District by **Mr. D. E. Gough,** B.Sc. (Eng.), A.K.C., M.I.E.E. Mr. Gough was educated at Westminster City School and at King's College, London. In 1927 he was appointed assistant engineer with Watson & Sons (Electro-Medical), Ltd., and later in the same year joined the County of London Electric Supply Co. as mains assistant. In 1930 he took up a similar position with the Croydon Corporation and in 1936 became associated with Central London Electricity, Ltd., first as assistant engineer and later as district chief engineer and chief construction engineer. Mr. Gough has held the position of manager designate of the Ravensbourne District, pending the retirement of Mr. Gripper, and he was previously design and planning engineer in the Southern Sub-Area of the L.E.B.

Mr. D. E. Gough

Mr. J. L. Warmington, manager of the Conductors and Telephone Cable Sales Division of W. T. Henley's Telegraph Works Co., Ltd., retired for health reasons on 30th September. Mr. Warmington was formerly also a director of United Telephone Cables, Ltd., and Southern United Telephone Cables, Ltd. He joined the Accounts Department of Henley's in 1922 and transferred to the Sales Department in 1925. In 1943 he was appointed assistant sales manager, Telephone and Switchboard Cable Section, and in 1950 manager of the renamed Conductors and Telephone Cable Sales Department. At the company's head office on 9th October, Sir Alexander Sim (chairman) presented Mr. Warmington with farewell gifts subscribed for by his many friends in the company. These included an outboard motor, a tea trolley and a pair of binoculars. Mr. H. S. Parsons (general sales manager) introduced Mr. Warmington, and Mr. E. J. Vidler (general manager) recalled his long association with Mr. Warmington and thanked him for his able assistance during this time.

Recent appointments in the manufacturing departments of the Metropolitan-Vickers Electrical Co., Ltd., include those of **Mr. D. Hutton,** A.M.I.Mech.E., as assistant superintendent, Switchgear Department; **Mr. V. D. Swain,** B.Sc.(Eng.), superintendent, Control Department; **Mr. F. G. Rose,** assistant superintendent, Main Production; and **Mr. K. R. Johnston,** B.Sc.(Eng.), assistant superintendent, Plant Department.

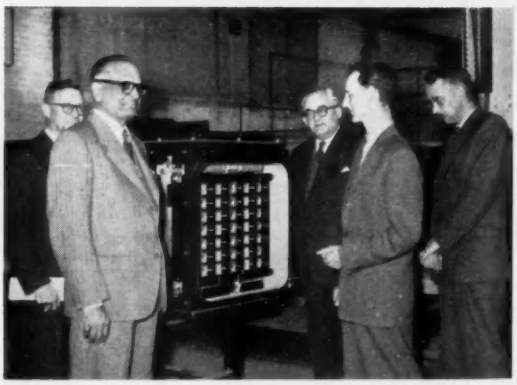
Mr. C. A. Britton, O.B.E., M.Eng., M.I.C.E., M.I.E.E., general manager and managing director of the Sudan Light & Power Co., Ltd., is now in this country on retirement leave. His actual date of retirement is 28th February next. Mr. Britton was educated at Oundle School and Liverpool University. On leaving the University he joined the staff of the Foundation Co. to work on the City and South London Railways extensions to Morden (Surrey) and in 1926 he took up an appointment with Callender's Cable Construction Co. to deal with the design and development of railway electrification schemes for India, later working on electrical distribution schemes in the South Wales area. He joined the British Insulated Cables Co. in 1929 for a tour of Malaya for the construction of the transmission systems for the Perak River Hydro-Electric Power Co. On return to England in the capacity of contract superintendent, he worked on contracts for the construction of the grid. Mr. Britton became deputy engineer and manager of the Chester electricity undertaking in 1934 and in 1941 was appointed borough electrical engineer at Maidenhead. In 1945 he was appointed deputy general manager of the Sudan Light & Power Co. and Wad Medani Light & Power Co. and was promoted to general manager of both companies in 1947. On the reorganisation of the company in 1952, when the management was transferred to the Sudan, he was appointed general manager and managing director of the Sudan Light & Power Co. and general manager and chairman of the Wad Medani Light & Power Co.

Mr. C. A. Britton

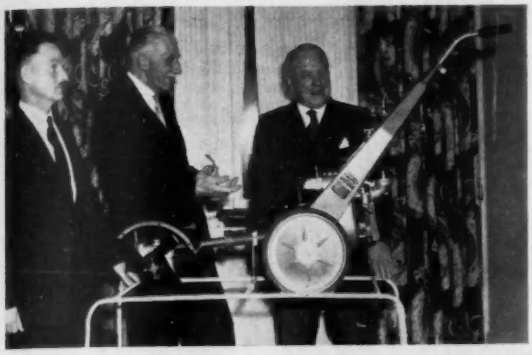
British Transport Docks announce that **Mr. J. A. Ross,** A.M.I.W., docks mechanical and electrical engineer, Middlesbrough and Hartlepools Docks, retired on 6th October. As a result of reorganisation, **Mr. P. K. Brown,** B.Sc., A.M.I.C.E., A.M.I.M.E., docks engineer, Middlesbrough and Hartlepools Docks, assumed responsibility for the whole of the civil, mechanical and electrical engineering organisation at these ports as from 1st October.

During a two-day visit (15th and 16th October) to the Rugby Works of the British Thomson-Houston Co., Ltd., **Mr. S. Sarangapani,** managing director of Heavy Electricals (Private), Ltd., Bhopal, India, was entertained by Mr. E. H. Ball, C.B.E. (managing director, B.T.H.), Mr. H. E. Cox (director, B.T.H., and general manager, Rugby Works) and other directors and senior executives of the company. He was accompanied by Mr. A. C. D. Moir (director, A.E.I. (India) Pvt., Ltd.) and Mr. W. L. Beeby (director of engineering, A.E.I. Overseas, Ltd.). In addition to meetings with engineering, drawing office and education executives, Mr. Sarangapani discussed

Left to right: Mr. J. L. Warmington, Sir Alexander Sim and Mr. E. J. Vidler



Mr. S. Sarangapani (left, foreground) in the B.T.H. germanium rectifier factory. Mr. H. E. Cox is on the extreme left



Mr. D. C. Lorkin (group managing director) presenting Mr. D. J. Thomas with a garden cultivator on behalf of the directors and senior staff. Left to right: Mr. F. R. Williams, Mr. D. C. Lorkin and Mr. D. J. Thomas

management, training, production, and factory accounting procedures with the works management. Amongst the factories he visited were the rectifier, germanium and heavy plant.

The retirement is announced of **Mr. J. N. Atkinson,** A.M.I.E.E., for the past ten years Perth City area manager, North of Scotland Hydro-Electric Board, and for ten years previously burgh electrical engineer with Perth Corporation. Mr. Atkinson has also been engineer and manager at Wick and was previously with Edinburgh Corporation, the International Power & Paper Co., Ltd., Newfoundland, and on the construction staff of the British Thomson-Houston Co., Ltd., with whom he served his apprenticeship.

The South of Scotland Electricity Board has appointed **Mr. F. S. Kynoch,** M.I.E.E., as engineer of the Edinburgh and Borders Area in succession to Mr. A. Menzies. Mr. Kynoch has been operation and maintenance engineer of this Area since 1956 when the former Edinburgh, Lothians and Southern Areas were merged. From 1950 to 1956 he was deputy engineer of the Edinburgh Area.

Mr. D. J. Thomas, A.M.C.T., M.I.E.E., South Wales area manager of Lancashire Dynamo Group Sales, Ltd., has retired after an association of thirty years with Lancashire Dynamo. He has been succeeded by **Mr. F. R. Williams,** A.M.I.E.E., who has served with Mr. Thomas at Cardiff since 1953.

Mr. Thomas, who received his technical education at the College of Technology, Manchester, and engineering training with the B.T.H. Co. at Rugby, first represented Lancashire Dynamo & Crypto, Ltd., in 1928. He is a past-president of the South Wales Branch of the Association of Mining Electrical and Mechanical Engineers, and has served as hon. secretary for seven years; he is also treasurer of the Western Centre of the Institution of Electrical Engineers. During the 1914-18 war Mr. Thomas served as an officer in the Royal Engineers.

Mr. Williams, who is also a member of the Association of Mining Electrical and Mechanical Engineers, received his technical education at Chesterfield Technical College and Sheffield University, and practical training in colliery electrical engineering with the Sheffield Coal Co., Ltd. Following experience first with Manchester Collieries, Ltd., and later as switchgear test engineer with Ferguson Pailin, Ltd., Manchester, Mr. Williams served overseas with the Royal Engineers during the last war. After the war he served at the Barton power station of Manchester Corporation and as technical assistant to the area electrical engineer (Nos. 2 and 3 Areas), East Midlands Division, National Coal Board. In 1950 he was appointed mining sales engineer for British Insulated Callender's Cables, Ltd., and in 1953 joined Lancashire Dynamo.

OBITUARY

Mr. J. D. Green.—The death occurred on 11th October at the age of seventy-two of Mr. John Douglas Green, M.I.E.E., founder of Green & Smith, Ltd., electrical engineers, Albert Works, Meadow Lane, Leeds. He was a former national vice-president of the Electrical Contractors' Association and had also served on the committee of the North Midland Centre of the Institution of Electrical Engineers.

Mr. W. A. B. Ames, Scottish director of the British Electrical & Manufacturing Co., Ltd., whose death on 10th October we reported in our last issue, was sixty-four. He commenced his career with the Lighting Department of Dundee Corporation, continuing his studies at the Dundee Technical College. During the 1914-18 war he served in Gallipoli and later was recalled to this country for engineering duty with Armstrong Whitworth & Co., Ltd. In 1919 he joined the British Electrical & Manufacturing Co. and opened the Scottish branch in Glasgow, later being appointed a director of the company.

Mr. C. L. Gorrie, a director of H. W. Field & Son, Ltd., died on 14th October after a short illness.

AWARDS AT BRUSSELS

THE British electrical industry's collective exhibit at the Brussels World Exhibition achieved a notable success by winning fifteen medals. This is thought to be the highest number of awards obtained by a single exhibit at an international exhibition and it included two grand prix awards, three diplomas of honour, three gold medals, three silver medals and four bronze medals.

Among the other exhibitors in the British Industry Pavilion who gained awards were: Babcock & Wilcox (grand prix, two gold and one bronze medals); Standard Telephones & Cables (grand prix, one gold and two silver medals); U.K. Atomic Energy Authority, the Nuclear Power Plant Co., and Doulton (grand prix); British Refrasil, Hoover and the English Electric, Babcock & Wilcox, Taylor Woodrow Atomic Power Group (diploma of honour); English Electric, Thermotank (gold medal); Revo Electric (gold, two silver and one bronze medals); B.B.C. (two silver medals); British Vacuum Cleaner & Engineering Co. (two silver medals); and Chloride Batteries and Burndept Vidor (bronze medal).

The Council of Industrial Design was awarded a diploma of honour, a gold and a silver medal for its displays of domestic equipment, heating equipment and lighting fittings; and the Birmingham Engineering Centre received a gold medal for its display of "construction equipment using electric power." The British Government Pavilion was placed third after the Czechoslovak and Civil Engineering Pavilions.

The individual exhibits were judged by an international jury on the basis of usefulness, quality and presentation, and the results were announced last week before the Exhibition closed. During the six months it was open some three million people visited the British Industry Pavilion out of a total attendance of 41 million.

Commenting on the success of the electrical and allied industry's exhibit, Mr. D. Maxwell Buist, export director, B.E.A.M.A., said the news of the awards had been received with "feelings of pride and justification." It had been proved at Brussels that neither "the nation nor its industries are decadent, as so many overseas critics try to tell the rest of the world." Referring to the number of girls and boys among the visitors, Mr. Buist said that the British electrical industry "believes in looking to the youth of to-day as part of their investment in a long-term future."

INDUSTRIAL NEWS

Strike at London Power Stations

About 500 maintenance men employed at ten power stations in the London area engaged in a one-day strike last Friday. Their object was to draw attention to a claim which they had made for the restoration of "differentials" which they say have been affected by general wage increases in recent years.

The National Joint Industrial Council for the Electricity Supply Industry had promised to examine the claim and actually began to give the matter its first consideration on the day of the strike.

Plessey Co.'s Work Transfer

The Plessey Co., Ltd., has decided to transfer, over the next nine months, the whole of its pre-formed wiring production from its factory on the Eastwood Trading Estate, Rotherham, to its Swindon works. Economic reasons are adduced for the transfer; the company says that it has been seriously concerned for some time about the falling-off of business from the aircraft industry. About 400 employees, mainly women, will be affected but the company is endeavouring to place them in its other factories where possible.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £180 0s 0d
COPPER, H.C. Electro	ton £245 5s 0d
Fire Refined 99·70%	ton £244 0s 0d
Fire Refined 99·50%	ton £243 0s 0d
COPPER Tubes ..	lb 2s 4d
Sheet	ton £272 10s 0d
H.C. wire and strip ..	ton £292 15s 0d
LEAD, English ..	ton £77 5s 0d
Foreign	ton £76 0s 0d
MERCURY	flask £78 0s 0d
TIN, block (English) ..	ton £739 0s 0d
ZINC, G.O.B. Foreign	ton £72 5s 0d
BRASS Tubes (solid drawn)	lb 1s 10½d
Wire	lb 2s 8½d
PHOSPHOR BRONZE Wire	lb 4s 1½d
PLATINUM	oz £21 5s 0d
RUBBER, No. 1 R.S.S. spot	lb 26½d—26¾d

Motor Price Reductions

The British Thomson-Houston Co., Ltd., announces that on and after 1st November next the prices of its type KN squirrel-cage industrial motors, built to British Standard dimensions, will be substantially reduced. The amount of reduction varies with the rating of the motor.

For the third time this year Crompton Parkinson, Ltd., announces reductions in its motor prices. With effect from 1st November, the prices of B.S.V. motors between 1 and 50 h.p. are reduced, on average, by 7½ per cent and those of B.S.D. (T.E.F.C.) motors between 1 and 10 h.p., on average, by 5 per cent. These reductions become effective overseas from 1st December.

Reduced prices are also announced by the English Electric Co., Ltd., from 1st November for its "LY" and "C" ranges of squirrel-cage motors which have standard dimensions making them interchangeable with machines of other manufacturers. The "LY" range covers totally-enclosed fan-cooled motors up to 25 h.p. and the "C" range ventilated motors up to 50 h.p.

Improved production methods have enabled Lancashire Dynamo & Crypto, Ltd., to again reduce its prices, as from 1st November. These reductions will affect motors in the British Standard totally enclosed ("Fankuld") range and ventilated types up to 50 h.p.

Motor-generator sets providing variable voltage supplies for the auxiliary motors in the automatic calender train for the production of rubber coated fabric recently installed by the Goodyear Tyre & Rubber Co. (Great Britain), Ltd. The electrical drives for the calender were provided by the English Electric Co., Ltd., who also supplied the control equipment

£200,000 Street Lighting Scheme

Battersea Highways Committee proposes to improve the lighting of side streets in the borough. Some 2,000 metal lamp standards would be replaced by 3,500 concrete columns and the lighting would be colour-corrected mercury vapour. The cost of the scheme is estimated at £200,000.

Control Gear for Bradwell

Motor control gear worth £250,000 is being built by Brookhirst Switchgear, Ltd., for the Bradwell (Essex) nuclear power station, and the first batch of equipment recently left the company's Chester works. The gear is being supplied under sub-contract to A. Reyrolle & Co., Ltd., and it will incorporate 550 contactor-type starters for the centralised control of turbine auxiliaries and reactor auxiliaries, fuel element handling plant, control rods and safety rods.

British Industry Pavilion at Brussels

The Federation of British Industries announces that George Cohen, Sons & Co., Ltd., one of the 600 Group of companies, have, on their behalf, sold the British Industry Pavilion at the Brussels International Exhibition. The pavilion will be re-erected at Hilversum, Holland, as a sports hall.

G.E.C. Export Guide

Two years ago the General Electric Co. put out the first issue of an Export Guide which was designed to indicate prospects for 36 commodity groups of British exports in 34 different countries. About 5,000 copies were distributed; the circulation has grown quarterly and now the number of people receiving it is about 15,000.

To mark the first issue of the third year of publication a Press conference was held at the Savoy Hotel, London, on 15th October when Mr. Leslie Gamage, M.C., M.A., chairman and managing director of the G.E.C., referred to the growth of interest in the Guide and mentioned that the latest (October) issue included a commendatory message from Sir David Eccles, President of the Board of Trade. Sir David had mentioned that the Guide was launched at a time when our export market was expanding. Mr. Gamage pointed out that now the struggle for export trade

was becoming keener it could be of even greater help.

Mr. N. A. H. Stacey, who is responsible for the compilation of the Guide, explained the methods by which the information was obtained and handled and how the situation in the various groups and markets was assessed.

The latest issue of the Guide analyses the main trends in British export trade since the war and refers to the resurgence of German and Japanese competition. It is suggested that our efforts have been directed to too great an extent towards the sterling area and too much emphasis was initially placed on consumer goods. Nevertheless the trade in capital equipment has stood up well to competition. There is now an increasing specialisation in goods representing a high skill content and the result has been substantial increases in exports of this class to the dollar area and to O.E.E.C. countries.

It is concluded that the sellers' market which characterised the post-war period has now virtually disappeared, even in cases in which a strong home demand has restricted export trade.

Electricity Supply Staff Salaries

The National Joint Council on 15th October agreed that, in view of the continuing improvements in productivity by administrative and clerical employees, salary increases ranging from £5 per annum at the age of 15 to £40 per annum at the maximum of the scales (£1,545) should be given as from 1st August last. Some 43,000 people are affected.

Mobile Display Unit

British Insulated Callender's Cables, Ltd., has prepared a mobile display unit which is being taken on a tour of various Continental countries. The unit, which is contained in a Humber Hawk estate car, comprises a number of panels showing a comprehensive range of mineral insulated cables, accessories and tools. It will be displayed at suitable sites in collaboration with local contractors and engineers. Demonstrations of the cable and accessories, and talks illustrated by lantern slides will be given to invited audiences. British consuls in each of the major towns to be visited are co-operating in this effort to further Great Britain's exports. During the present tour, extending over October and November, special attention will be paid to the shipbuilding yards in Belgium and Holland, and to industrial concerns in Germany.

B.I.C.C. mobile unit, displaying mineral insulated cables, which is touring the Continent

Battery Companies' Merger

In 1957 it was announced that the factory of the Tudor Accumulator Co., Ltd., Dukinfield, would gradually be closed down and production transferred to other factories within the group controlled by the Chloride Electrical Storage Co., Ltd. It is now announced that from the end of this month the activities of the Tudor Accumulator Co., Ltd., are to be completely merged with those of the D.P. Battery Co., Ltd., Bakewell, Derbyshire, who will produce and market the range of "Kathanode" and "Tudor" lead-acid batteries previously supplied by the separate companies. Mr. J. Nadin, O.B.E., the present chairman and general manager of the D.P. Co., will remain as chairman of the company, but will retire as general manager on 31st December next. Mr. N. L. Howell, at present general manager of the Tudor Co., has been appointed to succeed Mr. Nadin on 1st January.

Plumber Jointers' Wages

At its meeting on 15th October the Joint Industrial Council for the Electrical Cable Making Industry decided that the wages of plumber jointers, both in London and elsewhere, should be increased by 2½d an hour, raising the rates to 5s 2½d an hour in the London area and to 4s 11d throughout the rest of the country. Consequential increases are also made in the rates of pay of plumber jointers' mates, of learners and probationers, and of youths and boys. The new rates for plumber jointers' mates (at 85 per cent of the plumber jointers' rates) are 4s 5d in the London area and 4s 2d throughout the rest of the country. These increases came into effect as from the beginning of the first full pay period on or after 13th October.

Bells of St. Clements

The new bells of St. Clement Danes Church in the Strand, London (the Royal Air Force Church), will play any of three tunes. Revolving musical box barrels having "Tufnol" pegs in a pre-arranged sequence operate micro-switches which send impulses to mercury relay switches on the main control panel. These energise special solenoid coils made by Westool, Ltd., which move the hammers to strike the bells.

The bells were cast and the control panel installed by Mears & Stainbank, Whitechapel Bell Foundry.

Cable Drum Transporter

The accompanying picture shows a machine, one of two which have been developed for the Post Office Engineering Department for use in its cable stores. The truck is battery-electric propelled, with an electric hydraulic lifting mechanism to raise the drums for transportation.

A transporter for cable drums developed for the P.O. Engineering Department

The machine can handle a complete range of drum sizes up to 7ft diameter and 3 tons gross weight. Dual control is incorporated and an electric brake controls the descent of the vehicle on gradients. The machine has been designed and manufactured by the Montgomerie Reid Engineering Co., Ltd., Bramley.

Control Gear Demonstration Caravan

A demonstration van for the control gear division of G.W.B. Furnaces, Ltd., is now making a sales tour of South Wales. Exhibits include representative examples of contactor gear ranging from 10 to 1,400 A a.c. or d.c. These are mounted on an open frame where they can be easily examined; a number of isolators are also similarly mounted. Specimen stripped down push-buttons and complete push-button boxes, and other component parts are on display. Photographic enlargements displayed around the

walls show control gear installations of interest to electrical engineers in the South Wales area engaged in the heavier side of industry.

New G.E.C. Manchester Domestic Showroom

The domestic equipment showroom of the General Electric Co., Ltd., Victoria Bridge, Manchester, has been transferred from the first to the ground floor and now forms an integral part of the branch's main entrance foyer. Previously Magnet House offered limited facilities for individual window displays but now the new contemporary-style showroom provides a deep display area viewable by passers-by through the front windows and a newly constructed all-glass entrance lobby. A highlight is an illuminated alcove wall housing refrigerators, washing machines and water heaters. Above the alcove are shelves exhibiting small electrical appliances such as irons, toasters and hairdryers.

New domestic showroom at the G.E.C. Manchester branch

Mineral Insulated Cable Price Increase

The Rubber and Thermoplastic Cable Manufacturers' Association announces that owing to the increase in the price of copper the prices of C.M.A. mineral insulated cables shown in R.C.M.A. minimum trade price list MIC/5 have been increased by 7½ per cent as from 16th October. The prices of terminations in price list MIC/5 and accessories in price list MIA/2 remain unchanged.

E.D.A. at the Dairy Show

The main theme of the British Electrical Development Association's stand at the Dairy Show, Olympia, this week was "Electricity for Green Crop Conservation." The emphasis was on the latest techniques for drying in the bale and two methods of drying were demonstrated—platform drying both by the high/low blow method and with cold air only, and the system of drying bales in tunnels. A series of photographs showed bale drying installations in various parts of the country, together with samples of the material actually dried. A separate section of the stand was devoted to showing how electricity could be used for water heating and steam raising in the dairy. Exhibits in this section included a 20 gal dairy water heater, an "Electrobloc" steam raiser and an electric steam generator.

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 17th October is deemed to be 19s.

The "costs of materials" figures are: For electrical machinery and equipment the Board of Trade index figure published on 17th October is 177·7 (1949=100) and 114·5 (1954=100); both figures are provisional. For turbo - generating and allied plant: Materials used in mechanical engineering industries 185·6 (1949=100) and 123·5 (1954=100), blast furnaces and iron and steel melting and rolling (40 and 41) 190·8 (1949=100) and 130·0 (1954=100); figures are provisional. The price of ¾in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 17th October) is 46½d per lb.

Water Main Booster Pumps

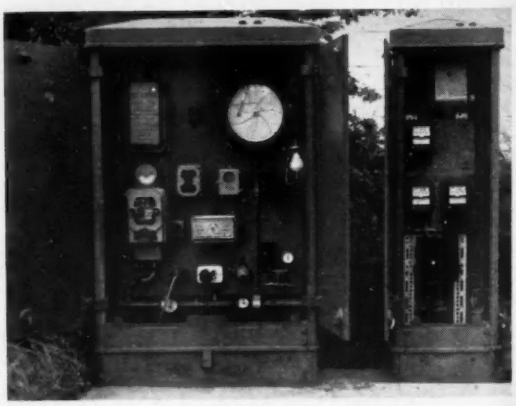
The problem of serving districts remote from pumping stations, from mains with inadequate pressure, faces many water companies. Banbury Water Department decided, after careful investigation of the various available methods and relative costs, to utilise submersible electric pumps as in-line boosters.

The use of submersible pumps enabled the booster stations to be installed without using any more surface space than that required by the electrical control gear. The complete booster stations are underground and automatic in operation and consist of an underground chamber covered by sectional water-tight cast-iron covers. They can thus be sited in the roadway, beneath the pavement or wherever is most convenient.

The submersible pump is contained within a section of main at each end of which a sluice valve is fitted to permit the removal of the complete unit for servicing. This can be done during off-peak demand hours and thus does not interfere with the normal mains supply as this is continued via a by-pass main. Electrical connections are of the plug-in type to facilitate servicing.

Four such stations have been installed, each with identical four-stage submersible pumps manufactured by James Beresford & Son, Ltd. They are of the 4A51-S10-5 type, driven by 10·3 h.p. motors contained in cast-iron sections of main measuring 10in internal diameter. The pump capacities are normally 6,200 g.p.h. at 187ft total head. "No-flote" electrodes are fitted to operate as cut-outs in the event of there being inadequate water to permit operation of the pump. A pressure switch shuts down the pump when the delivery pressure reaches a certain figure. The control gear is housed in a cast-iron weather-protected pillar which is heated by an 80 W tubular heater in winter.

Control gear for underground water main booster pump



Control Gear for Tankers

Brookhirst Switchgear, Ltd. (a member of the Metal Industries Group) is to supply electric motor control gear for seven 37,000-ton tankers for the P. & O. Group. The equipment is for the boiler and engine room auxiliaries and consists of marine switchboards and distribution boards. The company has also been awarded a contract for switchboards for two sets of boiler and turbine auxiliaries, for the coal and ash handling plant and for the water treatment and make-up water plants for the new Rugeley power station.

Works Visit

Members of the Bristol Branch of the Electrical Contractors' Association visited the works of the Simplex Electric Co., Ltd., at Oldbury, on 15th

Members of the E.C.A. Bristol Branch at the Simplex Electric Co.'s Oldbury Works

October. They were welcomed by Mr. G. D. Mason, general sales manager, who outlined the company's industrial products. After a short discussion with Mr. G. V. Donaldson, sales manager, Lighting Department, the party made a tour of the works, which included the foundry and conduit tube plant. Before the party returned to Bristol they were introduced to Mr. J. D. Johnson, commercial director.

Caroline Haslett Memorial Fund

In commemoration of the work of the late Dame Caroline Haslett a Memorial Fund has been established to provide educational opportunities for women in the scientific, engineering and technical fields. The Fund is in two sections: one will assist women employed, or seeking to be employed, in the electrical industry, on both the domestic science and engineering sides, and will continue and extend the work of the existing Caroline Haslett Trust; the other will apply in other than electrical fields.

Representative management committees are to be appointed to administer the Fund under trust deeds. Contributions to either section of the Fund, as donations or annual payments, should be addressed to the Caroline Haslett Memorial Fund, 25, Foubert's Place, London, W.1.

The sponsors of an appeal for contributions to the Fund are Lord Citrine, Sir Henry Self, Mr. Thomas Johnston, Mr. J. O. Knowles, Sir Lawrence Bragg, Miss Verena Holmes, Miss Margaret Hyndman, Q.C., Viscountess Astor and Viscountess Kilmuir.

Overseas Competition

Speaking last week at a conference called by the British Employers' Confederation, Sir Claude Gibb disagreed with a suggestion that extended credits would enable Great Britain to offer better competition in tendering for nuclear power station contracts. He also said that British firms should not emulate the Americans in giving guarantees regarding fuel radiation periods which could not be achieved. The United States Congress had had to vote $90 million to make good guarantees given by American manufacturers which the U.S. Atomic Energy Commission knew they could not implement.

On the subject of a heavy engineering contract in South Africa secured by the Germans, Sir Claude said that the price was such that there was either some hidden subsidy or the manufacturers were going to lose money.

E.I.B.A. Year Book

The 1958 Year Book of the Electrical Industries Benevolent Association, which is now available, is in form much the same as previous editions. The annual report of the Council and the accounts for 1957 are included, and there is a portrait of Dr. T. E. Allibone, the president for 1958-59. There are also lists of wardens, members of the Council, *ex officio* members, and members of the Court. The larger contributions to the Association are given and there is a list of the regional and branch committees, with the names, addresses and telephone numbers of the hon. secretaries.

Dewhurst & Partner, Ltd., in Canada

Dewhurst & Partner, Ltd., announce they have now established a Canadian subsidiary company, Dupar (Canada), Ltd., at Kitchener, Ontario. This company will be half-owned by Dewhurst & Partner and half by Dominion Electrohome Industries, Ltd., of Canada, and will engineer, manufacture and distribute the entire range of control equipment and brakes which is at present being marketed by the Dewhurst organisation in Britain.

Practical Electrician's Pocket Book

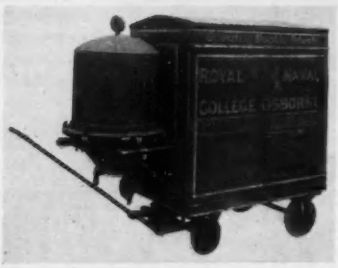
The 1959 edition of "The Practical Electrician's Pocket Book" (Odhams Press, Ltd., price 6s) has a number of new sections. These include chapters on domestic appliance repairs, labour-saving aids for contractors, luminous ceiling treatments, recent developments, and electronic computers. The section on motors has been re-written, concentrating on the induction type, and the chapters on automation, wiring, instruments, lighting, and electricity in agriculture and horticulture have been revised. There are now thirty-three sections to the handbook covering the everyday problems which arise in the electrical contracting industry.

New Kidderminster Foundry

A small luncheon party was held at Kidderminster, Worcs., recently by Fry's Metal Foundries, Ltd., to mark the opening of its new foundry at Worcester Road, Kidderminster, at which the Mayor of Kidderminster and other officials were the guests of honour. Mr. R. G. Harper, managing director, said that the foundry had been built in a modern style, with good facilities for office and works staff, as well as up-to-date plant and equipment.

B.V.C. Gift to Science Museum

The British Vacuum Cleaner & Engineering Co., Ltd., has presented to the Science Museum, London, the original vacuum cleaner (from Osborne House), the original vacuum pump, and the earliest domestic trolley type vacuum cleaner complete with tube and fittings (circa 1906). These machines were invented by the late H. Cecil Booth, the originator of the vacuum cleaner and founder of the company.



The domestic trolley type vacuum cleaner presented to the Science Museum by the British Vacuum Cleaner & Engineering Co., Ltd.

Trade Announcements

The **British Central Electrical Co., Ltd.,** has appointed Mr. W. C. Brown as technical sales representative for the western area. Mr. Brown was lately on the engineering staff of Earls Court, Ltd., where he dealt with electrical installation work on stands and maintenance of permanent equipment.

Ashley Accessories, Ltd., has appointed Mr. W. H. Ponting, 151, Longlands Road, Sidcup, Kent (telephone: Footscray 5330), as sales representative for Norfolk, Suffolk, Cambridge, Essex, Kent, East London, East Herts and East Sussex.

Mr. K. Waugh has been appointed public address representative in the south-west region of **Philips Electrical, Ltd.,** as from 1st November next.

Tasks of the Area Boards

THE inaugural address to the Institution of Electrical Engineers, Western Centre, on 13th October was directed towards those outside the electricity supply industry or recent entrants to it. Mr. R. W. Steel (South Western Electricity Board) emphasised the importance of maintaining good public relations with persons and organisations who were not necessarily consumers. The public expected higher standards from nationalised than from private industries partly perhaps because of the mistaken view that they spent "public money" (which strictly concerned such matters as compulsory rates and taxes), whereas electricity could be bought by the public if it so wished as a commercial transaction. The Boards had the duty (under the 1947 Act) of promoting the health, safety and welfare and of advancing the skills of employees; their activities in this direction were exemplified in the residential training courses, in which since 1949 42,500 persons had taken part, equivalent to one in four of the employees, in addition to one-day or half-day courses.

Capital Expenditure Restrictions

Many difficulties were caused through control of capital expenditure imposed by the Treasury which was subject to fluctuations each year with adverse effects on the fulfilment of programmes. Some alleviation might be obtained if capital expenditure on reinforcement of distribution systems and making extensions to rural areas could be taken one year with another like the trading results. A small drop in voltage seriously affected certain apparatus, particularly some television sets. In addition to the higher costs per mile of underground distribution compared with overhead lines, the route length had generally to be more.

Costs and Load Factor

In the South Western Area the Board's costs per kWh had risen by 1·8 per cent between March, 1949, and March of this year, but the cost of bulk supplies had increased by 45 per cent, although the annual load factor had improved from 41·6 to 45·8 per cent. As large-scale industry with continuous processes developed, fewer employees per kWh would be needed, thus lessening objections to two- or three-shift working. Space heating of commercial premises and small factories through the use of block storage heaters, floor warming by cables built in concrete and water heating, even in small houses, by means of electricity supplied at night would also greatly improve load factor. The low running costs of nuclear power stations should favour the development of off-peak supplies.

To avoid interruptions in electricity supply while making extensions to the 11 kV system, live-line working and mobile generating sets had been introduced. High-speed breakers were being installed to reclose circuits opened as a result of transient faults thus restoring supply automatically within a second. Another recent development was the auto-call alarm system which dialled the district office telephone number when a switch tripped in an unattended substation.

Quick Starting of Generating Plant

IN his chairman's address to the London Graduate and Student Section of the Institution of Electrical Engineers on 15th October, Mr. J. F. Outram estimated future loads in accordance with Table 1. As base loads would eventually be supplied from nuclear stations this would necessitate all fossil fuel stations (with the possible exception of the 550 MW units projected for Thorpe Marsh) being operated on a two-shift basis, which might entail repeated rapid starting of large boiler-turbine units. A technique was being evolved from tests on existing 30 and 60 MW plant in service. Apart from normal safeguards in regard to shaft eccentricity, differential expansion of the shaft relative to the cylinder and total expansion of the machine, all measured by electrical instruments, certain physical limitations were observed as far as possible. These were: maximum rate of temperature rise, 600 deg F/hr sustained for at least 10 min; maximum positive temperature differential of steam to metal of turbine, 200 deg F, and maximum negative differential on a hot machine 50 deg F; rate of saturation temperature rise at the boiler in excess of 100 deg F/hr to be governed by safe superheater metal temperatures and safe thermal stresses in boiler drum.

TABLE 1

	Whole Country			Thames Control Areas		
	1957-58	1960-61	1965-66	1957-58	1960-61	1965-66
Max. Demand MW ... (Average Cold Spell)	*19,097	24,800	32,000	*6,161	7,560	9,534
Load Transfer MW ... (At Time of Above)	—	—	—	*293	856	1,325
Average Annual Load Factor	48·0	44·5	44·9	39·1	40·6	41·4

* *Max. Simultaneous Demand 23rd January, 1958—17.30 hours.*

TABLE 2

Shut Down Period (Hours)	Operating Condition	*Boiler Time (Mins)	Turbine Time (Mins)	Total Time (Mins)
6·5	Unit	21	39	60
6	Range	—	46	46
51	Unit	84	101	185
56	Range	—	105	105

* *Commencement of pressure raising to start of turbine.*

An example was taken of Bankside "B" power station, which contained two two-cylinder impulse turbines with the steam chest cast integral with the top half of the h.p. casing and eight nozzle-control valves. For the rotors of the 68,570 kVA, 15 kV alternators electric heating during shut-down periods was provided. The 370 klb/hr single-drum natural-circulation boilers with horizontal convection superheaters were oil fired by 12 variable-sized atomised burners, oil being burnt at 250 lb/sq in and 210 deg F. As a result of improved operating techniques the plant was started up and put on m.c.r. in the times given in Table 2.

TRUNKING AND SWITCHGEAR PRODUCTION

EXTENSION OF AN EAST DEVON FACTORY

WE mentioned briefly last week the opening of extensions at the Ottery St. Mary (Devon) factory of Ottermill Switchgear, Ltd. The company's name is fully indicative—the main works is a former mill house (eighteenth century) situated on the River Otter in a most attractive part of the country. The products are industrial switchgear and cable and busbar trunking.

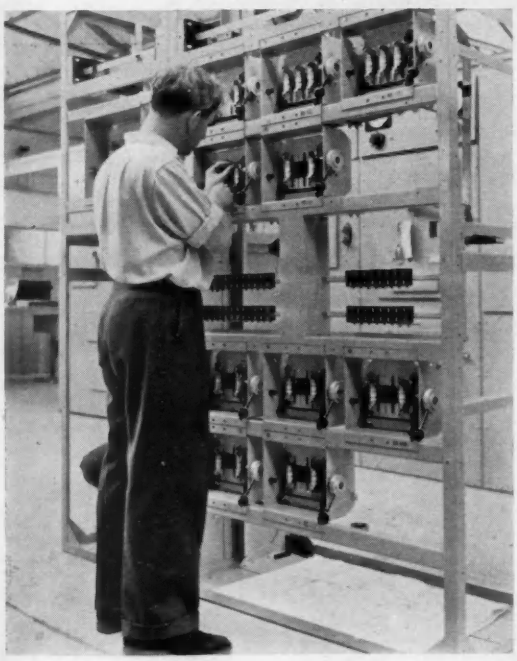
Seven sizes of cable trunking are produced, from 3in wide by 2in deep to 6in by 4in, with spring-on covers and a full range of ancillaries, e.g. intersection joints, bends, connection sleeves, etc.

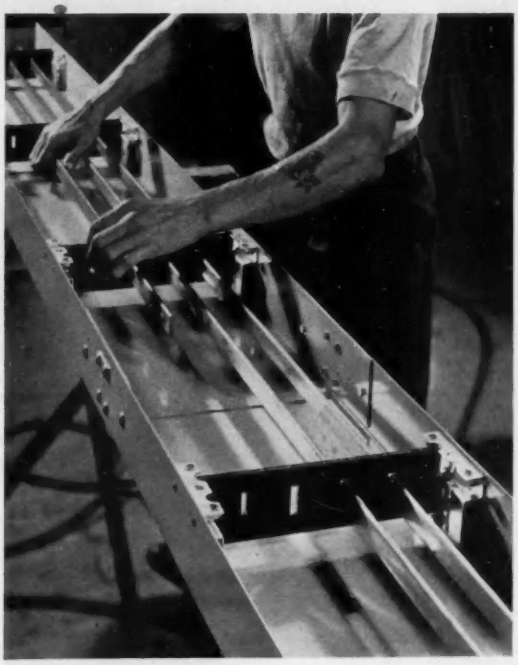
Busbar trunking is made in a number of sizes ranging from "miniature," normally for up to 100 A bars, to 600 A equipment with two, three or four bars according to the system employed. Positions are provided at 2ft intervals for the insertion of plug-in tapping boxes fitted with h.r.c. fuses; these boxes are made in 30, 60 and 100 A sizes, but currents up to 200 A can be provided for.

In addition to this horizontally mounted gear the company produces a number of sizes of trunking for rising mains, and also manufactures the necessary tapping-off equipment.

H.r.c. fuse-switches made at the works have ratings from 60 up to 100 A and are produced for single pole and

Above: View across the River Otter of the old and new buildings. Left: Fuse-switchgear being assembled at the works. Right: Insertion of busbars into large-sized trunking





neutral, double pole, triple pole, and t.p. and n. with various cable entries. The company's medium-voltage industrial triple-pole oil circuit-breakers are supplied in seven ratings, from 100 to 600 A, and are fitted with three overload trips and time lags; they can be provided with horizontal draw-out isolation gear.

All this equipment can be made up by the company in switchboard form with busbar chambers and, if required, with the necessary instruments.

While the original building has been adapted to accommodate most of the company's activities, the new three-bay extension provides more elbow room. It is very light and well ventilated and conveniently arranged. The company does its own presswork in the production of trunking and there is adequate and up-to-date paint spraying and drying equipment. Cubicle framework is fabricated in the works and during our recent visit we saw a number of good examples of this class of work. We were much impressed by the excellent finish of the gear which we inspected, both within and without. Among the work going through at the time was equipment for the B.O.A.C. training school, the Post Office, St. Paul's Cathedral, the headquarters of Barclays Bank and the Admiralty.

The works has a well-equipped machine shop and there are separate well-lighted design and contract drawing offices on the top floor of the original building.

In such pleasant surroundings we were not surprised to hear from the management that the staff and operatives (numbering just over 200) are well content, a statement which was confirmed in conversation with some of the men in the works.

During our visit we learned that about a third of the company's output is exported and that arrangements are being made for firms in Australia and India to manufacture Ottermill gear under licence. There is a certain amount of assembly being done in South Africa.

SCOPE OF I.E.E. MEASUREMENT AND CONTROL SECTION

WHEN he delivered his inaugural address as chairman of the Measurement and Control Section of the Institution of Electrical Engineers in London on 14th October Mr. J. K. Webb (Standard Telecommunication Laboratories, Ltd.) described the various subjects which came within the purview of the Section to illustrate its present scope. He divided the work of the Section into five main "panels," giving a heading to each in turn and then indicating its scope by briefly discussing one or more relevant items.

The first "panel" with which Mr. Webb dealt he called "Fundamentals, Standards and Laboratory Measurements"; this included notation and theorems besides the practical means of constructing and calibrating standards. He referred first of all to the fact that most of us were brought up on an ill-conceived notation of units comprising a practical hotch-potch of modified unrationalised c.g.s. units with their unfortunate duality of electrostatic and electromagnetic forms stuck uncomfortably together, and with 4πs popping up in all sorts of odd places without any obvious relation to the geometry of the problem. Mr. Webb thought that there was a very easy way out of this and that was wholeheartedly to adopt the rationalised M.K.S. system of electrical units and to use this exclusively. He then passed on to the consideration of electrical standards, which were naturally associated with the National Physical Laboratory, and pointed out that they were ultimately referred to mass, length and type and that progress was still being made in defining these parameters.

The next "panel" which the speaker mentioned was headed "Materials and Components" and he referred to the fact that every year there appeared some material which was particularly topical and engendered a spate of technical literature as its characteristics and potentialities were explored. Mr. Webb chose silicon as an example, the development of applications for which had followed the advancement of measurement techniques.

The third "panel," "Measurement Techniques, Devices and Instruments," gave a wide and flexible choice of subject ranging from nucleonics to transistors. Here he deviated from the beaten track and discussed recent developments with which he had been involved. He considered means of securing good electrical connections, a subject of interest to those engaged in such diverse fields as power cables, domestic wiring, telecommunication, computers and electronic apparatus. He referred to the unreliability of soldered joints and said that the printed circuit had eliminated the necessity of making certain types of joint individually by hand. Mr. Webb discussed the wrapped and bound connection in some detail and said that as a result of tests and field experience it had become evident that this type of connection had much to commend it over the equivalent soldered connection and had effectively eliminated the dry joint menace. Like all great inventions it had the merit of simplicity and was likely to play a big part in future wiring problems.

Under the heading of "Data Processing, including Analogue and Digital Computers" the speaker referred in particular to the automatic digital computer operating at electronic speeds. This was a recent innovation and one which was certain to have far-reaching repercussions as it came more and more to insinuate itself into the conduct of our technological and business affairs. Already it had been successfully applied to scientific computation and business accounting problems and to the control of machine tools.

Finally, Mr. Webb dealt with "Servo-Mechanisms and Control Systems." He said there had been much talk recently about automation which in the more popular sense might be said to be an attitude of mind that was always seeking to decrease the labour content of any series of jobs. Although servo-mechanisms were at the heart of automation, engineers were chiefly concerned with another more technical aspect, that of achieving by other means results which, by human agency alone, were very difficult, if not impossible to obtain.

Nuclear Energy Conference Report

THE Federation of British Industries has just issued its official report of the Federation's Conference on Nuclear Energy which was held at Eastbourne in April this year (see *Electrical Review*, 18th and 25th April). The report contains reprints of the papers presented by Sir Edwin Plowden, chairman of the U.K. Atomic Energy Authority, and other experts on both the technical and financial aspects of nuclear energy. The report is available from F.B.I. Print & Publications, 21, Tothill Street, London, S.W.1, price 15s.

Sixty Years' Progress

DIAMOND JUBILEE OF FULLER ELECTRIC, LTD.

THE diamond jubilee of Fuller Electric, Ltd., was celebrated at a luncheon given on 17th October for members of the electrical engineering profession. The occasion was marked by the presentation of gifts carrying good wishes from the management and staff of Allmanna Svenska Elektriska Aktiebolaget, Sweden, a firm with whom Fullers have always been associated. In his speech the chairman, Mr. A. H. Frampton, acknowledged the contribution made by ASEA to their success, and Mr. H. V. Pugh, chairman of the Eastern Electricity Board, replying for the guests, spoke of the company's growth in parallel with the development of the supply industry.

In 1896 Mr. J. Leslie Fuller was appointed to handle the sale of ASEA single-phase motors in Great Britain. As a result of his successful representation the Fuller-Wenstrom Electrical Manufacturing Co. was formed on 1st July, 1898, to operate in the British Isles. The offices in Cannon Street, London, E.C., were small, there was a staff of four, and the first year's trading totalled only £1,684. It was from these beginnings that the present company has grown, able to record orders for 1957 amounting to nearly £2½ million.

To make possible quick deliveries of motors operating at the frequencies then in use, which ranged from 25 to 125 c/s, motor carcases were imported from Sweden and wound in a small factory in Haunch of Venison Yard, Brook Street off Bond Street, which was taken in 1901, fifteen workmen being employed. After four years of steady progress these premises became inadequate and the site of a new factory had to be decided upon. The locality finally selected was Walthamstow, situated near the docks for quick delivery of motor carcases from Sweden, and having suitable labour available. A factory building was rented at Blackhorse Lane and 5,750 sq ft laid out for building motors up to 200 h.p. A company was formed in 1910 with a share capital of £5,000, to sell electric motors and accessories built either at the ASEA works in Sweden or at the Walthamstow factory, and in the same year the company's offices were moved to larger premises at Norfolk House, Laurence Pountney Hill, E.C.4. As a result of continued expansion, the Blackhorse Lane Works became badly overcrowded and larger premises were again sought. The present site in Fulbourne Road was purchased in 1915 and a 20,000 sq ft factory was built; it is this factory that has steadily developed in the ensuing years to the 300,000 sq ft works

Tap changer construction and test departments

that exist to-day. Branch offices were opened at Birmingham and Manchester and the agency for the Century Electric Co. of St. Louis, U.S.A., was secured.

The decision was made in 1919 to start transformer production and the initial programme covered the building of transformers ranging from 5 to 100 kVA. Advance in size and volume was rapid. In 1923 one order for medium-size transformers was valued at £50,000 and in 1924 ten 2,000 kVA units were ordered. Towards the end of 1926 an order received from the Perak River Hydro-Electric Power Co. for seventy-six transformers included ten 3,650 kVA, four 3,500 kVA and four 2,500 kVA units, the majority of which were for a working voltage of 63,000. Thirty-two 15 MVA units and associated earthing transformers ordered in 1929 by the Central Electricity Board were the first for 132 kV, and on-load tap-changing equipment was incorporated.

As a result of this order it was decided to manufacture on-load tap-changers and the company has since supplied equipments to many leading transformer manufacturers. Up to 1932 only conventional three-phase motors had been built at Walthamstow, but production of the Schrage type three-phase variable-speed a.c. commutator motor, invented in 1910 by H. G. Schrage, an ASEA engineer, was then introduced and a specialist department of the company has handled their application for over thirty years.

During the war years part of the Walthamstow factory became engaged in the manufacture of armaments and the Government provided two smaller factories at Nottingham and at Leicester which were devoted to the production by the company of anti-aircraft devices.

A large transformer assembly bay 75ft high, having a floor area of 24,000 sq ft and a span of 65ft was built during 1953-54, to enable the company to enter the e.h.v. field. Costing half-a-million pounds, this bay was specially designed for the production and testing of transformers of the largest outputs working up to 400 kV. In this bay two 100 ton cranes were provided at the upper level and a lift of 75 tons can be made from the lower. All necessary transformer testing plant, including a two million volt surge generator, has been installed. The tanks of even the largest transformer can be made in the factory, the former transformer assembly shop with a 75 ton crane lift being used. The acquisition (in 1955) of the West Works added 60,000 sq ft and enabled the manufacture of special welding electrodes and control gear to be undertaken at Walthamstow, the branch factories at Leyton, Poplar and Birmingham being closed down.

The assembly bay for production of the largest Fuller transformers

The first e.h.v. transformers were ordered by Australia, four 15 MVA transformers with 230 kV windings and 1,050 kV impulse level being required. Ten similar transformers have since been built for that country and seven more are on order. Eight 45 MVA transformers with the same insulation level were ordered in 1956 for export to Canada. The first of a range of on-load tap-changers incorporating high-speed resistor transition was delivered in 1956. All tap-changers of 10 MVA and above are now of this type and smaller high-speed resistor tap-changers are being developed. Auto-transformers of 275/132 kV for the supergrid require 132 kV fully insulated on-load tap-changing gear and a high-voltage tap-changer has been developed for this duty. On-load tap-changer production has been increased to more than five times the 1948 level.

The share capital of the company was acquired in April, 1957, by the Brush Group, Ltd., and the company has now become a member of the Hawker Siddeley Group. An agreement has been made with ASEA, however, enabling the company to manufacture under licence their transformers, on-load tap-changers and variable-speed a.c. commutator motors and use any ASEA patents and data covering such products. The company is also the sole representative for ASEA in the United Kingdom.

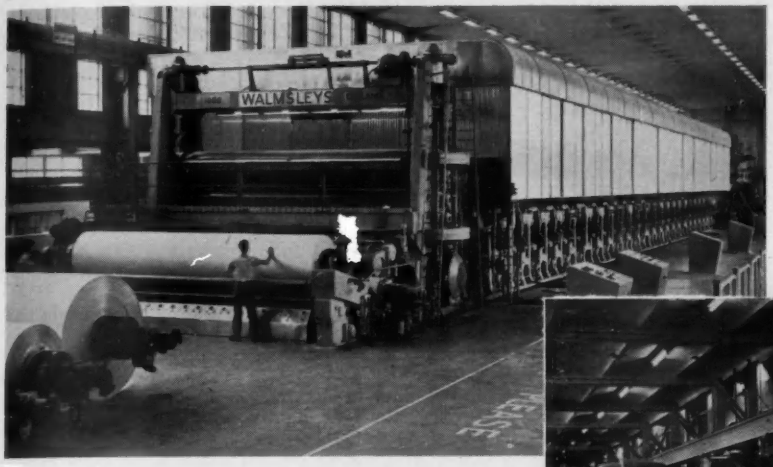
The manufacture of motors, switchgear and transformers was seen during a recent visit to Walthamstow, including the construction of one of the four 120 MVA, 275/132 kV auto-transformers on order from the Central Electricity Generating Board for use at Northfleet, the largest transformer yet built by Fullers. Two similar units, but having an increased rating of 180 MVA, are on order for installation at Canterbury. Convertor plant rated for 160 MW at 200 kV d.c. has been ordered by the C.E.G.B. from the company as representatives of ASEA, for installation at Lydd in connection with the cross-Channel power transmission cable.

I.E.S. Presidential Address

AT the opening meeting of the 1958-59 session of the Illuminating Engineering Society held at the Royal Institution on 14th October, Mr. C. C. Smith delivered his presidential address entitled " Light and Life."

Mr. Smith said that without artificial lighting the whole pattern of life would be changed. The hours of natural light were insufficient for modern needs and consequently the science or art of light pervaded every aspect of our daily lives. To preserve a reasonably high standard of living it was essential that an extremely high rate of production be maintained and here lighting improvements had been of inestimable value, directly, by speeding and improving works processes, and indirectly, by decreasing accidents and creating a pleasant environment for work.

Lighting techniques and light sources had placed in the hands of the specialist and surgeon tremendous assistance in their fight against illness and disease. Light enabled them to perform the most delicate operations, light from sources of extremely small dimensions permitted them to see the origin and development of disease actually inside the body, and light had been used to alleviate pain or fight the disease at its source.



Left: The new No. 13 machine at Aylesford Paper Mills showing the aluminium clad ventilating hood over the 100ft long drying section

Below: The Harland drive aisle

PAPER MILL EXTENSION

HIGH-SPEED INSTRUMENTED MACHINE

A PAPER-MAKING machine producing mechanical printings and newsprint at a speed of 2,000 ft/min is now operating at the Aylesford Mills of the Reed Paper Group near Maidstone, Kent. Designed and manufactured by Walmsleys (Bury), Ltd., in conjunction with the Group's Engineering Division, the machine and the mill in which it is housed have cost a total of £3 million. Extensive use has been made of instrumentation and automatic control to maintain consistent quality, and a sound-proofed, air-conditioned central control room has been provided containing the controls and records of all process variables not immediately concerned with the direct operation of the machine, local control panels and desks being provided for this along the machine aisle. An audible and visual alarm system operates on abnormal conditions, and interlocks ensure adequate automatic protection at critical parts of the plant.

Pulp is prepared by hydrapulpers and hydrafiners, reducing the consistency to 5½ per cent. The two pulps used, groundwood and sulphite, are mixed in the required ratio together with dyes, additives and scrap paper or "broke" returned from later parts of the process, and the prepared stock is pumped via Jordan refiners to the machine headbox, a remotely operated plate valve metering the flow of stock into the paper machine system. The cleaned stock, diluted to a fibre content of 0·5 per cent, is passed on the machine wire over twenty 13½in diameter table rolls, a large proportion of the water draining through the wire and leaving the sheet of paper formed on the top surface. Further water is removed as the wire passes over a series of stainless steel vacuum suction boxes and the suction couch roll. A vacuum pick-up roll removes the web from the machine wire and three presses fitted with suction bottom rolls transfer it to the steam-heated drying section where it is dried to approximately 6 per cent moisture content by 59 steam-heated 5ft diameter drying cylinders. A Lippke Supertest 712 moisture recording equipment is fitted to record the longitudinal moisture content and the transverse moisture profile of the sheet. The reel drum is of the Pope uniform speed type with pneumatic brakes, winding up to a 63in reel, and the supercalender, built by Walker Brothers (Wigan), Ltd., is a ten-roll stack having a designed speed of 2,500 ft/min.

Electrical Installation

Power for the machine is taken from an 11 kV ring main at the mill substation through two 7,500 kVA, 11/3·3 kV and three 1,500 kVA, 11 kV/415 V Ferranti transformers controlled by 500 MVA B.T.H. circuit-breakers. Two further circuit-breakers link the 11 kV switchboard to the ring main system and one acts as the direct switching starter for the 2,000 h.p. 11 kV synchronous motor of the motor-generator for the paper machine Harland drive. A 3·3 kV switchboard has two incoming circuit-breakers from the 7,500 kVA transformers and three supplying group motor starter boards, in addition to four controlling other installations on the site. A 1,300 kW generator driven by a 2,000 h.p. salient pole synchronous motor supplies power to the 23 d.c. motors of the Harland sectional drive. By running at unity or a leading power factor the synchronous motor assists in maintaining a high power factor for the whole installation. The machine drive is designed for an operating speed

Switchboard for the Harland drive

range of 500 to 2,000 ft/min, the speed of each section being automatically controlled by a Harland patented differential unit operating an infinitely variable carbon pile type rheostat in the section motor field.

Supercalender Drive

The supercalender has a main driving motor of 750 h.p. and a 90 h.p. motor drives the drum of the Pope type reel. Both are supplied from a 600 kW generator driven by an 875 h.p. 3·3 kV squirrel-cage motor which is direct-on-line started. Constant paper tension is maintained between the calender and reel, the reel booster being controlled by a servo-operated current regulator which is biased during acceleration and deceleration by a Harland accelerometer modifying the booster output to develop more or less torque in the reel motor as required. To provide continuous high-speed operation of the supercalender a John B. Kohler flying splicer is installed which allows a second reel to be loaded and accelerated to match the speed of the original unwinding reel, after which the sheet from the second reel is spliced to the paper running at speeds of 1,000 ft/min and the sheet from the original reel cut off. A 7½ h.p. d.c. motor supplied from a grid-controlled mercury-arc rectifier unit accelerates the new reel and a system of electric brakes and clutches provides selective control of the two reels in the unwind stand.

The winder drive comprises a 275 h.p. main driving motor and an 82 kW braking generator coupled to the unwinding reel, the current for the drive being supplied by two 115 kW generators driven by a 360 h.p. 3·3 kV squirrel-cage motor. Paper tension is adjusted between ¼ and 2½ lb per inch of width automatically by a current regulator operated by an electro-mechanical servo-mechanism. Motors driving pumps, fans, refiners, etc., are three-phase squirrel-cage machines started direct-on-line, supplied at 415 V up to approximately 200 h.p. rating and 3·3 kV above. All the 3·3 kV motors have individual power factor correction capacitors of T.C.C. manufacture which, together with the machine drive synchronous motor, result in an overall power factor for the mill exceeding 0·9 lagging. The 80in rewinder is powered by a Ward-Leonard set supplied by Printing & Paper Drives, Ltd., with a single 35 h.p. main drive motor and a 50 h.p. squirrel-cage motor driving the motor-generator set. The machine house fluorescent lighting installation consists of 148 twin lamp G.E.C. fittings with vitreous enamelled trough reflectors giving an illumination of about 12 lumens/sq ft at machine floor level.

GAS COUNCIL'S REPORT

PROGRESS with developments which "if they fulfil their promise, would seem to point to a wholly new pattern of gas supplies" are described in the report of the Gas Council for the year ended 31st March, 1958 (H.M.S.O. 10s 6d). Particular importance is attached to new processes and sources of supply of gas, and to the development of a national high-pressure grid system. Production would be concentrated in a relatively few large units near suitable coal fields and refineries, and the grid would also take surplus gas from coke ovens and the diminishing number of low-pressure carbonisation plants; gas produced from liquefied methane and, if deposits are found, natural gas.

A total net surplus of £2·8 million was earned by the twelve Area Gas Boards during the year on a gross income of £388·6 million but individual deficits were shown by the Southern and South Western Boards. In the nine years since vesting date £422 million has been invested in fixed assets, of which £154 million has been provided from depreciation reserves.

The total number of consumers rose by 53,407 to 12,929,394, of whom 12,180,417 were domestic consumers. Sales of gas amounted to 2,651 million therms as against 2,607 million therms in the previous year, an increase of 1·7 per cent. Domestic consumers took 1,326 million therms (against 1,328 million in 1956-57), industrial consumers took 788·7 million therms (749·6 million), and commercial consumers 398·6 million therms (387 million). The average revenue per therm used rose from 19s 1d to 20s 2d.

New gasmaking plant with a total capacity of 124 million cu ft a day was brought into operation during the year and, of this, 11 installations with a total capacity of 39 million cu ft a day were for the gasification of oil. The concentration of production in the larger and more economic units continued and by the end of the year there were 536 gas works compared with 1,050 at vesting date. A "substantial proportion" of the 1,933 miles of new mains added during the year was for bulk transmission and integration schemes.

Sales of domestic appliances were again affected by the continuing restrictions on hire-purchase and the high rates of purchase tax, and although hire-purchase sales rose by 4·7 per cent, cash sales were 2·5 per cent lower than in the previous year. The total sales of appliances for cash or on hire-purchase are shown in the table.

Type of Appliance	Number Sold (000's)	
	1956-57	1957-58
Cookers	522·3	540·3
Space heaters	131·1	124·3
Water heaters	171·8	156·2
Wash boilers	183·6	222·1
Washing machines	36·8	
Refrigerators	12·2	22·1

For comparison, it may be noted that sales of these appliances by the Electricity Boards during 1957-58 were: cookers, 228,802; water heaters, 184,288; wash boilers, 79,591; washing machines, 71,711; and refrigerators, 49,962 —an increase in each case.

AIR-CONDITIONED FACTORY AT SWINDON

TRANSISTOR MANUFACTURE

FORMED in May last year by the Plessey Co., Ltd., and the Philco Corporation of America, Semiconductors, Ltd., is now manufacturing at Swindon high-frequency germanium and silicon transistors by the Philco electrochemical process. Production started in July last following the installation of the manufacturing equipment, some of which is of American design and construction.

To produce transistors with a high degree of reliability, manufacture takes place in the windowless air-conditioned factory in a virtually dust-free atmosphere under controlled temperature and humidity conditions. An air-conditioning plant comprising mechanical filters, refrigeration and heating units, and electrostatic precipitators is installed, giving an air temperature of 68 deg F ±1 deg and a humidity of 45-55 per cent, with a dust content less than 1 cubic micron per cubic centimetre. Air locks are used to prevent dust entering on personnel or materials and all internal surfaces are given a sprayed p.v.c. coating to limit the accumulation of dust.

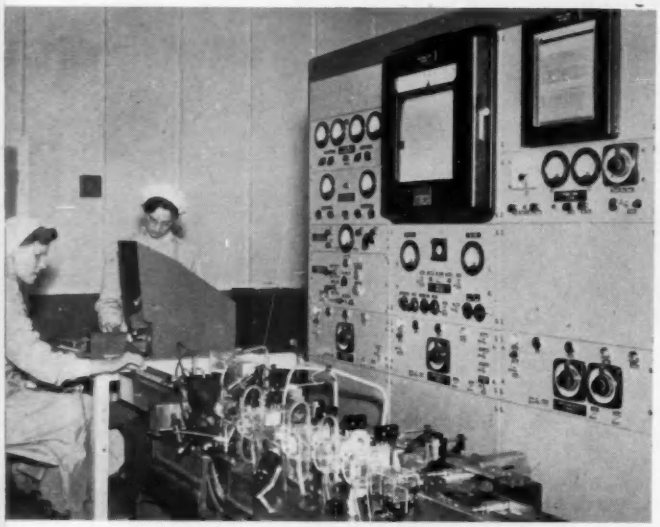
Radio frequency induction furnace for crystal pulling

High-purity water of 18 million ohms/cm resistivity from the company's de-ionising plant and nitrogen and hydrogen gases obtained from the British Oxygen Co. are piped throughout the plant in p.v.c. tubing, the nitrogen being previously dried in a Birlec moisture absorber. Four Metalectric radio-frequency heaters totalling 60 kW supply the crystal-pulling induction furnaces. Compressed air and vacuum for air conditioning, cleaning and other factory services is supplied by two 300 cu ft/min, 100 p.s.i. Broom-Wade compressors and a B.V.C. vacuum pump, both compressed air and vacuum systems being piped to outlets at various positions in the factory. The high degree of illumination necessary is provided by closely spaced flush mounting ceiling fittings, each containing three 80 W fluorescent tubes giving an illumination of 85 ft-candles at desk level.

Material Preparation

Germanium purified by zone refining to one part in 100 millions is melted by heating in a crucible contained in a silica tube filled with argon. Antimony is added to obtain the required electrical characteristics and a temperature detector and sensitive servo-amplifier maintain the germanium at a constant temperature just above its freezing point, approximately 900 deg C. A grain-orientated " seed " crystal is dipped into the molten metal and withdrawn, the germanium crystallising on to the " seed " to form a single crystal. Both the " seed " and the crucible rotate to obtain a uniform temperature distribution. The crystal is sawn into thin discs by a high-speed diamond-impregnated wheel, and a planetary lapping machine gives a uniform thickness over the whole diameter of each disc, which is then chemically etched in a rotating plastic beaker. Wafer scribers scratch the surface of the glass-hard germanium with a diamond tool, and vacuum pads crack the germanium along the scratch, converting the disc into small rectangular blanks which are graded by a roller thickness gauge to an accuracy of ±0·00005in.

The transistor stem, consisting of three wires sealed in glass inside a metal ring, is mounted in a work carrier used as an indexing jig for later operations. A rectangular nickel tab is welded to the centre wire and a germanium blank soldered to the tab, the assembly being



The pit etching and indium electrode plating process are carried out on the automatic transfer machine

checked by a dual-beam comparator which projects a magnified plan and elevation of the assembly on to a ground-glass screen. After a preliminary wash in de-ionised water in the automatic transfer machine, two jets of electrolyte impinge on opposite sides of the germanium wafer to produce concentric pits. A single jet carrying an infra-red monitoring beam is then used and since the intensity of the infra-red transmission is determined by the thickness of the germanium at the bottom of the pit, a detector on the other side can feed a signal to a servo-amplifier which stops the etching process when the required thickness is reached. This thickness determines the high-frequency performance of the transistor, and a pen-recorder allows the progress of each etching cycle to be observed. Another washing cycle follows, and then indium electrodes of the required diameter are plated into the etched pits. After washing and drying with hot nitrogen an electrical check is made, also recorded on a chart. Thin nickel wire is located by an optical servo system on the centre of the electrode and soldered to it by radiant heat, the free end of the wire being welded to one of the stem wires.

The transistor is chemically cleaned, rinsed, and dried, and the silicone grease filled top caps are welded on in an atmosphere of dry nitrogen. The electrical characteristics of the completed transistors are checked in the final test bay and a proportion of the batch is run at the maximum rating or at elevated temperature to simulate a long period of normal operation. On successful completion of these tests the remainder of the batch is printed with its type number and packed.

Production is confined at present to high-frequency germanium surface barrier transistors having a cut-off frequency up to 30 Mc/s, though the range will be extended to include h.f. silicon alloy and other types.

The main contractors for the factory were Richard Costain, Ltd., the engineering services being installed by Mathew Hall & Co., Ltd.

COMMERCIAL CONSUMER SURVEY

UTILISATION Research Report No. 8, produced by the Electricity Council, gives the results of a survey carried out by the Electricity Boards on the lines of the earlier survey of domestic consumers, though lacking much of the compactness of that oft-quoted original. It was initially planned to relate to the year 1951, but one Board was unable to collaborate, others were delayed in its completion, and one (and that the largest) could not carry out the work until 1955-56. As a result, while the figures relate, on the average, to 1953 they straddle a period of four years and have only now been made available. The sample consisted of 5,000 consumers out of a total of 1¼ million, but an effective representation of the larger consumers was obtained by using a three times greater sampling fraction for consumptions above 10,000 kWh.

The results indicate that some 59 per cent of all commercial consumers are shopkeepers, one-third of whom combine shop and domestic premises. About 10½ per cent are offices and 7½ per cent public buildings; warehouses, cinemas, hotels, etc., make up the remaining 23 per cent. The installed load is about one-third lighting and one-third space heating and an analysis of the consumption attributes 55 per cent to lighting and 25 per cent to space heating. Thus the consumption per kilowatt installed is something like twice as much for lighting as for heating. In addition to showing a better load factor the lighting consumption has less seasonal variation. Comparing the March and September quarters the proportions of the lighting consumption are 29 and 21 per cent as compared with the heating proportions of 40 and 11 per cent.

Figures are given for appliance saturation factors, i.e. the percentage of consumers having particular types of appliance. These indicate that 45 per cent of commercial consumers have portable electric fires, 17 per cent have all-electric space heating, 19 per cent employ power applications, 9 per cent have water heaters and 7 per cent electric cookers.

Many of the results are of undoubted interest, both to supply engineers and to manufacturers, but they cannot be expected to lead to any general conclusions comparable in value to those of the domestic survey. There can hardly be any valid "average" consumer characteristics when the average has to cover shops, cinemas and swimming baths, and better results might have been obtained by making separate surveys of the different classes of consumers, starting perhaps with the largest class, namely shops.—D.J.B.

All-Electric School

WITH accommodation for 450 pupils, Ormlie Senior Secondary School, Thurso, which was opened on 15th October by Mr. Niall MacPherson, Joint Under-Secretary of State for Scotland, is the largest all-electric school in the North of Scotland. Electricity provides power for lighting, cooking, water heating, direct heating, motive power and floor heating. Supply has also been made available for heating the school swimming pool.

The Tottenham establishment of the Benjamin Electric, Ltd.

Benjamin Electric Jubilee

Industrial Lighting Equipment Production

THIS year the Benjamin Electric, Ltd., has attained its fiftieth year. The company was formed in 1908 to exploit the lighting inventions of the late Mr. Reuben B. Benjamin who already had companies in the United States and Canada; Mr. Benjamin was one of the first directors. The business was started in Rosebery Avenue, London, E.C., but in less than ten years it outgrew these premises and a factory was acquired at Tottenham in 1918.

Since then there have been extensions from time to time until to-day the works occupy several acres and give employment to about 900 people. Although the company has had associations with the radio industry its main concern has always been industrial lighting and it is a striking fact that the well-known "R.L.M." reflector, one of the inventions of Mr. Benjamin, was the original standard dispersive reflector and is still the recognised form of this type of fitting of which millions are in use all over the world. Other familiar names under which the company's products are sold are "Saaflux," "Duoflux," "Rodalux" and "Flurolier" (fluorescent lamp fitting).

At the works the raw material (sheet steel, brass, aluminium and copper) are cut to size and shape on guillotine machines. The blanks go on to the press shop where they are formed to the required shape. An outstanding feature of the works is the "Crysteel" vitreous enamelling plant in which is applied the durable finish for which the company is noted. Other types of finish are applied, including the anodisation of aluminium in the commercial development of which the company played an important part.

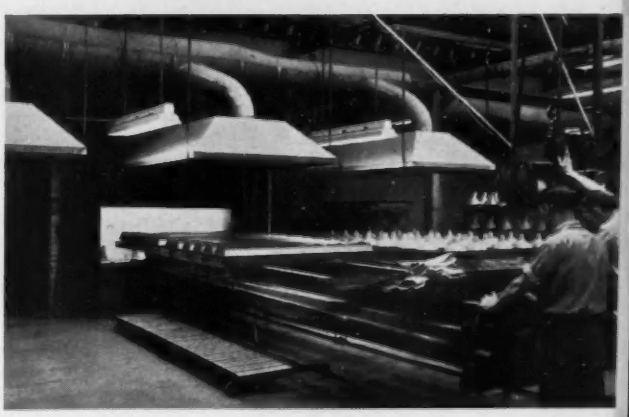
Other sections of the works include the assembly department and a well-equipped machine shop and a tool room in which all the jigs and tools are produced.

In 1952 the Benjamin Electric inaugurated a scientific research establishment at the works and it claims that this is the most up-to-date and completely equipped laboratory of its kind. It is intended primarily to develop lighting fittings and lighting technique for industry, but its staff also maintains a constant check on the products of the factory. Included in the equipment is a 12ft diameter photometric integrating sphere.

The company can justly claim to have contributed as much as any lighting concern to the raising of the standard of industrial lighting during its half century. Moreover, it has played an important part in the export field; it is this country's largest exporter of industrial lighting fittings and has a strong representation in many overseas markets, particularly in the eastern hemisphere and the Commonwealth.

As part of the jubilee celebrations the directors recently entertained the staff and their relatives and friends to a supper, dance and cabaret at the Criterion Restaurant, London, when about 800 people were present. At a Press luncheon last Friday at Whitehall Court, London, S.W., Mr. A. E. Iliffe, chairman of the company, gave some interesting, as well as amusing, details of persons and events in the company's history. He mentioned that next to Edison and Sir Ambrose Fleming, Mr. Benjamin had held the largest number of patents. Mr. Iliffe paid a tribute to the late Mr. Guy Campbell who was chairman and managing director of the Benjamin Electric, Ltd., for forty-seven years. Mr. H. G. Campbell, managing director, extended a welcome to the Press representatives.

A batch of reflectors leaving one of the "Crysteel" vitreous enamelling furnaces



CASTLE DONINGTON

NEW EAST MIDLANDS DIVISION STATION OFFICIALLY OPENED

General view of the power station

LAST week Castle Donington power station was officially opened by Colonel Lord Cromwell, Lord Lieutenant of Leicestershire. Since we described this station in detail in our issue of 28th June, 1957, considerable progress has taken place in the construction of the plant and, of the ultimate six 100 MW turbo-alternator boiler units, five are in commission.

Castle Donington is being built for the East Midlands Division of the Central Electricity Generating Board on the south bank of the River Trent about seven miles to the south-east of Derby. The architectural treatment of the building is unusual; the exterior is of utilitarian construction, but it does give a pleasing general appearance. The gable ends of the concrete walls are faced with processed granite panels while the boiler house walls above operating floor level consist of adjustable metal louvres with asbestos cement sheeting and patent glazing. The turbine house walls are also of asbestos cement sheeting with a horizontal sheet of patent glazing 11ft high. The reason for using these materials was to achieve the maximum economy in building costs.

The steam raising plant consists of six Babcock & Wilcox single-drum boilers, each with a maximum continuous evaporative capacity of 830,000 lb/hr when using feed water with a temperature of 400 deg F at the economiser inlet. The steam conditions at the superheater outlet are 1,600 p.s.i. and 1,060 deg F. These boilers are the largest in Europe and have a capacity 1½ times that of any boiler so far made in this country.

Each boiler is associated with a 3,000 r.p.m. Metropolitan-Vickers turbo-alternator equipped with its own surface condensing and feed heating plant. The turbines are of two-cylinder impulse design with a double-flow l.p. cylinder. There are sixteen h.p. stages and five l.p. stages on each side, including a Baumann multi-flow exhaust stage. The conditions at the turbine stop valve are 1,500 p.s.i. and 1,050 deg F. The station has been designed to have an overall thermal efficiency of about 32 per cent (on kWh sent out) and, in fact, this figure has already been exceeded.

The turbine hall showing the 100 MW Metropolitan-Vickers sets

I.E.E. Subscriptions and Income Tax

THE Commissioners of Inland Revenue have approved the Institution of Electrical Engineers for the purposes of Section 16, Finance Act, 1958, and the whole of the annual subscription paid by a member who qualifies for relief under that Section will be allowable as a deduction from the amount of his emoluments assessable to income tax under Schedule E. The circumstances relating to claims for income tax relief are as follows:—

Commencing with the year ending 5th April next, a member who is an office holder or employee is entitled to a deduction from the amount of his emoluments assessable to income tax under Schedule E of the whole of his annual subscription to the Institution, provided that: (a) the subscription is defrayed out of the emoluments of the office or employment, and (b) the activities of the Institution so far as they are directed to one or both of these objects—(i) the advancement or spreading of knowledge (whether generally or among persons belonging to the same or similar professions or occupying the same or similar positions); (ii) the maintenance or improvement of standards of conduct and competence among members of the profession—are relative to the office or employment, i.e. the performance of the duties of the office or employment is directly affected by the knowledge concerned or involves the exercise of the profession.

A member who is entitled to the relief should apply to his tax office as soon as possible after 31st October for Form P358, on which to make a claim for adjustment of his " pay as you earn " coding.

Installation Engineering

I.E.E. UTILISATION SECTION CHAIRMAN'S ADDRESS

THE design and execution of electrical installation work was the subject of an address given by Mr. R. A. Marryat (Marryat & Place, Ltd.) as chairman of the Utilisation Section of the Institution of Electrical Engineers, on 16th October. This, he said, must remain the Section's particular concern. It was our duty to ensure that wiring in homes, offices, factories and all other buildings facilitated full and abundant use of electricity, thereby providing better living and higher productivity. The preparation of the complete design of an electrical installation required consultation with the architect, owner and occupier of the building and with those concerned with providing engineering services. Even so, the lack of information in the initial stages, which was the rule rather than the exception, made resort to experience and the guidance contained in relevant Codes of Practice necessary. Much thought was being given to the revision and extension of these codes and he hoped that they might soon be recognised as authoritative guides.

Stating that the alternative means of circuit protection must be considered at an early design stage, Mr. Marryat discussed earth loop impedance, using a graph showing the limits of application of various forms of earth fault protection. Provision should be made for an earth connection from the local supply transformer to a consumer's earthing terminal, a practice being increasingly adopted in a number of supply areas. In the past water and even gas mains had been used as consumers' earth electrodes, but no jurisdiction was held over the maintenance or repair of such systems, and it was felt that an electricity supply service should have no need to resort to other systems to obtain adequate protection. Results of loop-impedance tests in several small factories had shown that the main fuse or circuit-breaker of perhaps 200 A rating would not operate to isolate an earth fault although smaller fuses protecting main circuits would. In such circumstances, he said, local supply transformers or some form of earth-leakage circuit-breaker should be installed.

Mr. Marryat suggested that a survey of electrical installations in larger buildings completed before publication of the 13th edition of the I.E.E. Regulations would have shown that in many the basic requirements set out in Regulation 406 were not fulfilled. Substitution of a circuit-breaker fitted with differential-current earth-leakage and overload trips, or fitting a suitable tripping relay to an existing breaker, would overcome this difficulty and also afford better fire risk protection.

He considered that a larger consumer's control unit than that covered by B.S. 1454, which was intended for small houses, was needed, incorporating a 100 or 150 A main circuit-breaker and miniature breakers to protect 60, 30 or 15 A sub-circuits as required. Normally, the sub-circuit breakers would have overload trips only, but voltage-operated earth-leakage trips could be used where earthing conditions were difficult. The main breaker would be fitted with delayed current balance and overload trips, and an h.b.c. cartridge type incoming service fuse would be used. Such a unit would afford full protection against short-circuit faults, leakage from neutral conductors and dangerous voltages on the metal framework of accessories and appliances.

The tendency to restrict the size of m.v. distribution transformers to 500 kVA limited the lengths of earth-return paths and placed the maximum short-circuit current at about 15,000 A. In buildings where heavy loads were concentrated, two or more such transformers might be installed supplying separate sections of the load, and now that dry-type transformers were becoming available they might be installed on upper floors to avoid heavy rising mains. Space should be allowed for every switchboard permitting at least 50 per cent and preferably 100 per cent extension. The introduction of cubicle type boards effected a considerable space saving.

He then considered heating losses occurring in distribution cables and cable de-rating to reduce the cost of such losses, using graphs showing the running costs for various conductor sizes and the effect of varying the rating of a cable. The need for flexibility in industrial installations had led to metalclad feeder bars and plug-in busbar systems, and to the extended use of cable ducts, trunking and perforated cable trays. By applying metalclad feeder bars for distribution from the substation and using plug-in busbar distributors fed through fused connection boxes, substation switchgear could be reduced to a minimum and local distribution centres virtually eliminated. In trunking systems the original installation should occupy only a small proportion of the total space, to permit extension without overcrowding and loss of flexibility. He mentioned the increasing use of mineral-insulated cables and p.v.c.-insulated armoured and p.v.c.-sheathed cables with their compact glands, and remarked on the labour saving achieved by using crimped solderless cable lugs.

Standardisation

Considerable scope existed for further dimensional standardisation of equipment and accessories, he declared, citing combined switch and fuse units, fluorescent lighting fittings and electric fire elements. He looked forward to the time when every domestic and office appliance would be sold complete with a B.S. 1363 plug. He also felt that plugs and socket-outlets for exclusive use on 110 V and 55 V low-voltage supplies should be standardised.

On the subject of installation design, Mr. Marryat said that good results could only be attained by detailed planning and careful site supervision, this being particularly applicable in industry where grouped motor control panels were becoming a feature of modern installation technique. All important control panels should be clearly marked, and spare fuses and components should be provided within the panel enclosure together with a clear circuit diagram enabling the engineer in charge to make the correct replacement in an emergency without fear of needlessly interrupting a healthy circuit.

In conclusion, Mr. Marryat said "I believe that the installation engineer has a vital part to play in the future development of our industry. The time has come when electrical installation work should be co-ordinated as a whole by those who can appreciate the technical and economic requirements of all the equipment and services that may be immediately and ultimately involved in any project. Electrical engineering is becoming of ever greater importance in all parts of the world, and wherever there is civilisation there is useful work for the installation engineer."

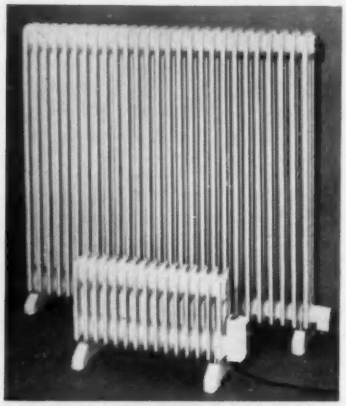
NEW ELECTRICAL EQUIPMENT

Industrial Space Heater

An electric space heater with an element loading of 5 kW is now being marketed by GULF RADIATORS, LTD., 229, Regent Street, London, W.1. It utilises the permanently sealed oil-filled principle originated by their associate company, Hurseal, Ltd.

Basically designed for use in industrial or large commercial premises where it may be necessary to confine the heating source to one place or to reduce the number of heating appliances, this large safety radiator has a heating surface of 89 sq ft and an output of approximately 17,075 B.Th.U/hr.

The heater is a 3-column type and measures 42in high (with feet) by 46in wide by 8½in deep. It operates on a thermal cut-out which limits the radiator surface temperature to 170 deg F. Thermostatic and time switch control can, however, be added if required. The price is £48.



Gulf 5 kW oil-filled radiator shown with a smaller ¾ kW model

Electronic Thermo-switch

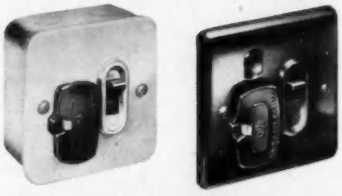
An electronic thermo-switch designed to maintain temperatures at a pre-set value, giving immediate relay action following any deviation from this value, has been marketed by A. M. LOCK & CO., LTD., Prudential Buildings, 79, Union Street, Oldham, Lancs. Any variation of temperature results in a sensing element producing an out-of-balance signal in a bridge network, either in or out of phase with the bridge voltage, depending upon the sense of the temperature change. The signal is then amplified and applied to a phase sensitive detector which operates a heavy duty control relay, making or breaking if the measured temperature is lower or higher than that selected on a pre-set controller.

The temperature elements, consisting of a platinum winding housed in a thin stainless steel tube, are interchangeable and can be situated remotely from the control unit. Available for use in temperatures ranging from −200 deg C to +500 deg C, the control action operates on a temperature differential of ±0·1 per cent of the range covered. The temperature setting control is situated behind a door which may be locked to prevent unauthorised interference. Delivery can be offered in two to three weeks at a price of £32 10s, inclusive of sensing element.

Lock thermo-switch

Fused Spur Boxes

A new range of fused spur boxes with double-pole switches has been introduced by M.K. ELECTRIC, LTD., Wakefield Street, London, N.18. They are for use with panel fires, water heaters, etc., and enable such permanently fixed appliances to be installed to conform with the I.E.E. Wiring Regulations where it is required to disconnect all live supply conductors from an appliance.



M.K. fused spur boxes: left, surface metal-clad box (No. 942); right, flush all-insulated unit with pilot lamp (No. 960)

The flush patterns, designed to fit into B.S.1363 boxes, are made either with insulated plates moulded in brown or ivory or with brass plates finished BMA or matt chrome. Surface metal-clad units are made from zinc coated steel, "Bonderized" for rust resistance, and stove enamelled aluminium. All types are fitted with a single-pole 13 A fuse. Both flush and surface patterns are available with or without pilot lamps.

The prices, per dozen, range from £5 12s for the flush insulated pattern, in brown, to £11 15s for flush brass units with matt chrome finish, fitted with pilot lamps.

Universal Metal Products reinforced glass-fibre meter case

Weatherproof Meter Enclosure

A reinforced glass-fibre weatherproof house service meter enclosure produced by UNIVERSAL METAL PRODUCTS, LTD., Langley Road, Salford, 6, Lancashire, is designed for external wall mounting, permitting meter readings to be taken without entry into the premises. The enclosure, which can contain the service fuse and cutout in addition to the meter, comprises three mouldings, front, rear and cable cover, which are all produced in black by the matched-metal process using polyester resin and glass-fibre preforms. The cable entry is half-sheared and is removed if required when the meter is installed.

Sub-miniature Relay

The series 335 sub-miniature relay with a balanced armature announced by MAGNETIC DEVICES, LTD., Exning Road, Newmarket, Suffolk, is hermetically sealed in a brass can 0·78in wide by 0·35in thick by 1·03in high (including pins). The contact arrangement is double pole double throw with a minimum contact pressure of 10 grams and pull-in and drop-out times of 5 and 3 milliseconds respectively. The contacts are rated for 2 A at 28 V d.c. or 110 V a.c. with a non-inductive load, and coils of maximum resistance 5,000 Ω wound for all standard voltages are available. Connection is by soldered pins, but various mountings and a socket will be marketed shortly.

Anodised Aluminium Wire

Aluminium wire continuously anodised by a process which provides the wire surface with an integral film of aluminium oxide has been introduced by the ALUMINIUM WIRE & CABLE CO., LTD., 2, St. James's Square, London, S.W.1. The film has excellent insulating properties and aluminium wire of electrical purity treated by the "Anodal" process may be used for many types of electrical

windings. "Anodal" wire is available in a range of standard British sizes from 16 s.w.g. (0·064in dia.) to 26 s.w.g. (0·018in dia.) and standard metric sizes from 1·60 mm to 0·45 mm dia. The supply of non-standard and finer sizes down to 36 s.w.g. (0·0076in dia.) or 0·20 mm dia. will be considered on request. Small rectangular sections can also be supplied. The insulation has very high thermal stability: coils have operated successfully at temperatures up to 550 deg C. It also has good heat transfer characteristics, permitting lower and more uniform temperatures to be maintained throughout a winding.

Tractor Battery

A 6 V "Silver Exide" battery, developed by CHLORIDE BATTERIES, LTD., Clifton Junction, Manchester, as initial equipment for tractors, is also suitable as a replacement in other vehicles. Assembled in a hard rubber container measuring 10¼in long by 7in wide by 9$\frac{3}{16}$in high, the Type 3-FAHF17EL battery incorporates

Chloride Batteries 6 V tractor battery

"Porvic" separators and CB.95 alloy plate grids and has a capacity of 115 Ah at the 20-hour discharge rate. It weighs 46 lb, including electrolyte, and is priced at £8 7s 6d, uncharged.

Gamma-Ray Electrometer

A gamma-ray electrometer has been developed by ELECTRONIC INSTRUMENTS, LTD., Lower Mortlake Road, Richmond, Surrey, in conjunction with the United Kingdom Atomic Energy Authority, to measure the concentration of uranium ore in a slurry flowing through a steel pipe in an ore treatment plant. The absorption of the gamma rays in the pipe varies with the density of the slurry, but the change in absorption is small compared with the total gamma-ray flux incident on the ionisation chamber. To measure this small change in the presence of a large signal the meter is designed around the E.I.L. "Vibron" unit, an electro-mechanical device which replaces the electrometer valve and provides a high degree of sensitivity and stability.

Heavy Capacity Stacker

The latest addition to the "Sherpa" range of stacking trucks made by SALISBURY PRECISION ENGINEERING, LTD., 1, Buckingham Palace Mansions, Buckingham Palace Road, London, S.W.1, is the model 9, a pedestrian-controlled stacker with a high lifting capacity but which is readily manœuvrable by hand. The model 9a lifts 10 cwt at 20in load centres to a height of 7ft and is normally supplied with a rigid mast but models with folding masts are available to negotiate low doorways. The standard model has a 34in straddle and is supplied either for battery or mains electric operation. A similar model, the 9b, has a telescopic mast enabling the load to be raised to a height of 11ft 6in.

Conductor Joint Sealing Sleeves

Polythene sleeves filled with silicone grease for the moisture-proof sealing of individual conductor joints in plastic insulated communication cables have been introduced by BRITISH INSULATED CALLENDER'S CABLES, LTD., 21, Bloomsbury Street, London, W.C.1, marketed under the name "Polytel." The tubular sleeves are sealed at one end and filled with a non-melting, non-solidifying, silicone grease having good dielectric properties and moisture and oxidation resistance, with a working temperature range suitable for home and overseas use. The sleeves must be protected from the damaging effect of sunlight on the natural and lightly pigmented polythene and this is normally achieved by using a joint sleeve, or two layers of black adhesive p.v.c. tape with 50 per cent overlap. Sleeves are available in a wide range of sizes and colours to suit various types of cables and joints.

Submersible Limit Switch

A watertight limit switch for applications where complete submersion is involved has been developed by BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester. The single pole self-resetting switch has a quick make and break action and is suitable for a.c. and d.c. control circuits. Rated for a maximum current of 10 A a.c. at 550 V, it can be connected to operate as a normally closed or normally open switch for single circuits or a make and break switch if both contacts are used.

Direct or roller lever operated switches are available, requiring an operating movement of ¼in with permissible overtravel of $\frac{7}{32}$in with a direct push or a $\frac{3}{16}$in movement and a $\frac{5}{16}$in over-travel with lever action. An actuating force of 6 lb is required for the plain push type and 3¾ lb for the roller lever type. The watertight enclosure is arranged for side or base fixing.

Bulkhead Fitting

An all-plastic bulkhead fitting, with an internal polished metal reflector, has been introduced by METWAY ELECTRICAL INDUSTRIES, LTD., Metway Works, Brighton, 7. The base of the fitting is moulded black and the cover is of translucent plastic. It is designed for a 40 W lamp and is fitted with a cable gland at each end, a knock-out enabling the cable to be brought in from either side.

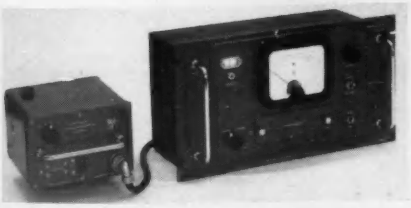
The price of the fitting is 10s 6d (list No. 2682/PH). It will shortly be available with red, yellow or green lenses.

Two-way Adaptor

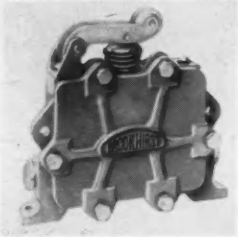
A two-way unfused shuttered adaptor for 13 A ring main socket-outlets has been introduced by E. F. ELECTRIC, LTD., Willow Lane, Watford, Herts. The moulded casing is of compact design, having overall dimensions of 1¾in by 1¾in by 1⅛in excluding pins, and is available in three colours, brown, ivory white and ruby. The adaptors comply with B.S. 1636 and are priced at 60s per dozen, brown, or 66s per dozen, ivory white and ruby.

Time Switch and Thermostat

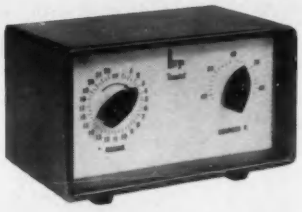
A combined time switch and thermostat intended primarily for the control of domestic electric heating, but also applicable to shops, offices, etc., has been introduced by HERGA ELECTRIC HEATING SYSTEMS, 1, 3 & 5, Northolt Road, Harrow, Middx. The "Timostat" comprises a synchronous timer unit operating over a period of 22 hours and suitable for connection



Electronic Instruments gamma-ray electrometer



Brookhirst watertight limit switch



Herga "Timostat"

to a 200/250 V, 50 c/s a.c. supply, and a bi-metal type thermostat covering a range of 40 to 80 deg F with 15 A silver contacts for controlling heating loads up to 3 kW.

The unit is portable, with a 4ft length of three-core cable for connection to a wall socket, and alternative shuttered socket-outlets are available for 15 A or 13 A three-pin plugs. Contained in a cabinet 6¼in wide by 4¼in deep by 4in high, having either walnut or ivory finish, the "Timostat" is priced at £5 19s 6d.

Variable Speed Drives

The range of "Varimag" variable speed drives manufactured by LANCASHIRE DYNAMO NEVELIN, LTD., Oxted, Surrey, has been extended to include three-phase units for outputs from 3 to 10 h.p. with a speed range of 20 : 1. The drive comprises a controller and a variable speed motor which may be switched direct-on at any speed and load, with a speed regulation from light load to full load of ±2½ per cent.

The controller is essentially a magnetic amplifier giving a variable reference voltage from a three-phase bridge connected, semi-conductor rectifier, the voltage level being determined by the setting of a hand operated potentiometer. The amplifier is connected to balance the motor armature voltage with the reference voltage obtained from the potentiometer. Any difference existing between these two voltages results in an error correction signal being fed into the magnetic amplifier. The speed controller is an entirely static equipment making use of silicon semiconductor rectifiers for the larger outputs.

Pump Motor Controller

The "ThermoPak" glandless accelerator is an electric motor-driven pump for forced water circulation in central heating systems, and the manufacturers, SIGMUND PUMPS, LTD., Team Valley, Gateshead, 11, have now introduced a controller for the models 1 and 2. The control switch interrupts both lines, requiring no other isolator, and the special windings employed make the use of a conventional starter unnecessary. A pilot light is incorporated indicating when the pump is running and knockouts are included for cable entry. The controller can be used with t.r.s. cable, with or without an earth conductor, or it can be mounted on a standard round conduit box. The switch is available in an attractive insulated ivory finished case from the manufacturers or their distributors, at a retail price of 16s 6d.

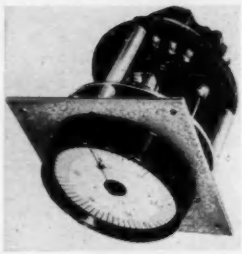
Synchronous Clock

An automatic synchronous clock, Type ASC, which can be energised, stopped and re-set from a remote position, is now being marketed by ELECTRICAL REMOTE CONTROL CO., LTD., The Fairway, Bush Fair, Harlow, Essex.

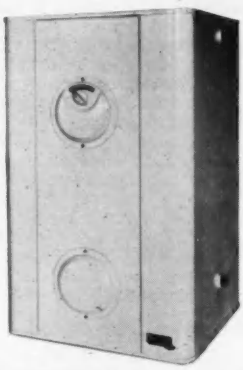
The clock incorporates a synchronous motor driving a pointer on a dial through an electromagnetic clutch. The motor can be running continuously, but the pointer commences its travel in a clockwise direction from the moment of energisation of the clutch coupling the motor to the pointer. Disconnection of the voltage supply from the motor will stop the movement of the pointer, making possible reading of the elapsed time at any convenient moment.

De-energisation of the electromagnetic clutch always resets the pointer to zero position within half a second. The electromagnetic clutch of the timer can be operated by a voltage different from the supply to the motor of the clock. The ranges of time dials are from 0-30 sec to 0-12 hr. The front panel is 5in square and the overall length is 6¼in. The clock can be supplied for either panel or wall mounting and the price is £9 16s.

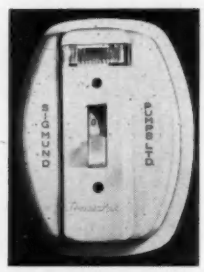
Lancashire Dynamo Nevelin variable speed drive controller



Electrical Remote Control Co.'s Type ASC automatic synchronous clock



Santon "Monmouth" thermal storage water heater



Sigmund "ThermoPak" pump controller

Water Heaters

An improved version of the "Monmouth" thermal storage water heater has been announced by SANTON, LTD., Somerton Works, Newport, Mon. Horizontal heating elements, each with a loading of 3 kW, are fitted at the top and bottom of the heater, and each is controlled by its own fully adjustable thermostat.

A control switch, mounted on the top heater cover, enables either heater to be switched on but not both at the same time. Because of the high loading of the top element, and the speed with which it heats the water, it is quite practicable to switch off the "Monmouth" for long periods during the day.

Two sizes are available, a 20 gal model suitable for the average-sized home, and a 12 gal model for flats, etc. Particular attention has been paid to the design to prevent undue mixing on water being withdrawn. The outside casing, cabinet shaped, is finished in white enamel and the dimensions of the heater are such that it can be fixed under the draining board if required. It is of the pressure type and is designed to be fed from the standard open-top ball valve tank with conventional vent pipe arrangement. The heater should never be connected direct to the water main.

The company also announces a new design of rectangular wall mounting cistern type heater available in capacities of 5, 7½, 12, 15 and 20 gal. The units incorporate their own ball valve tank and are suitable for connecting direct to the water main and for supplying water to two or more points. Owing to the design of the heater it is essential that the base should be fitted in line with, or higher than, the highest hot water tap to be served. The finish is white enamel, with black top and base and the contemporary styling of the heaters enables them to fit into almost any decorative scheme. They are completely automatic.

FLUORESCENT FITTINGS

THE addition of three new fittings to the "Atlantic" fluorescent range has been announced by Atlas Lighting, Ltd., 233, Shaftesbury Avenue, London, W.C.2. The first of these is the series 1B, which has an opal diamond-textured acrylic plastic diffuser with interchangeable clip-on end panels in six colours. It is available in 8, 5, 4 and 2ft sizes, the 8ft version having a plain opal diffuser. Metalwork is stove-enamelled white with matt black chassis end plates.

The second fitting, series 1C, is a twin-tube 5ft fitting with an acrylic plastic diffuser and canopy moulded in one piece, with a ribbed underside which contrasts with the other surfaces. It is obtainable with either "Quickstart" or "Glowswitch" control gear. The third, the 1E series, is a twin-tube fitting with a louvred diffuser attachment. The complete diffuser is pre-assembled and can be easily removed from the chassis.

There are now 450 different styles and sizes in the "Atlantic" range and two new features which will now be standard on all fittings are a special universal suspension channel with sliding stirrups, adjustable to any desired fixing centres, and a modified diffuser support tray which simplifies installation and maintenance.

The company also announces four new series extending the Atlas "Popular" range to industrial reflector and commercial diffuser fittings, together with a twin-tube version of the original "Popular Pack." All are available in 5ft single- and twin-tube versions. The KB series industrial reflector fittings are provided with an open-ended metal reflector, while the KA series enclosed diffuser fittings have an enclosed reeded opal "Diakon" diffuser which fits easily on to the basic chassis. This diffuser is open-ended and slides over the metal end plates.

The KT series have a single-piece translucent opal "Perspex" trough and the KO series, also in 4ft sizes, are fitted with "Twinluve" pearl-finished polystyrene diffuser sections.

Over 200 different fittings based on one compact universal section spine are covered in the new "Essex" range of fluorescent fittings introduced by Ekco-Ensign Electric, Ltd., 45, Essex Street, London, W.C.2. Fittings in 4ft and 5ft sizes are available now and it is anticipated that 8ft fittings will be introduced early next year.

The outstanding feature of the fittings is the removable control gear tray, which is hinged, the hinge comprising a safety hook and a bridge. This tray, and the lampholder platforms, can be lifted out from the spine, leaving it empty. The spine, the 5ft size of which weighs only 7 lb, is attached to chain or conduit suspension or fixed directly to the ceiling. Five simple operations, by one man, complete the installation of the fitting. Cable entry is provided for by two ¾in holes in the spine. The 5ft fittings have 36in fixing centres and the 4ft size have 24in centres. There is a choice of a variety of reflectors which can be attached to the spine and the same size of reflector is suitable for both single- and twin-tube fittings.

The "Perspex" diffuser is attached to the spine by a special coverplate and no tools are required for assembly. All lampholder fittings are of the spring-loaded, turret type, of moulded plastic, and all tubes are bi-pin. The standard finish on the metalwork is white stoved enamel.

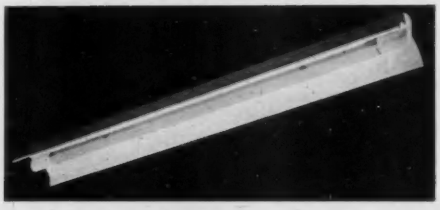
A new range of fluorescent fittings for commercial, industrial or domestic use have been introduced by Siemens Edison Swan, Ltd., 155, Charing Cross Road, London, W.C.2. These fittings, known as "Sielect," are available in a range of epoxy resin finishes, claimed to possess many special advantages. All types can be utilised for ceiling or chain rod suspension and are supplied with switch or constant start control gear. The control gear, with tapped chokes 200/250 V, is mounted on a ceiling tray drilled for B.S. box connections at 21 or 40in centres. The battens are fitted with plastic end plates and flicker shields over b.c. type lampholders. "Diakon" reeded diffusers are available.

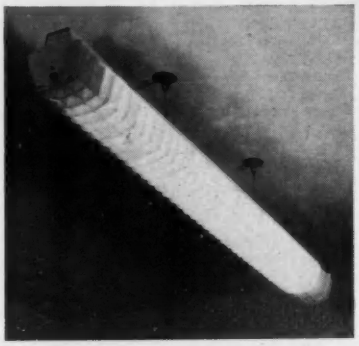
The prices vary from £6 15s to £23 1s 7d per unit, including purchase tax.

The model 151 5ft, 80 W fluorescent fitting, introduced this season by the Stearn Electric Co., Ltd., 31, Vauxhall Bridge Road, London, S.W.1, is fitted with moulded plastic end caps designed to support the tube and cover the tube ends in one operation. This is claimed to cut down installation time. Back plate fixing arrangements have been improved by the provision of wire suspension loops.

The price of the fitting, with the tube, is £4 19s 8d, including purchase tax. Reflectors are also available for attachment to these fittings and the model 141 4ft, 40 W range, which quickly transform the battens into industrial trough fittings.

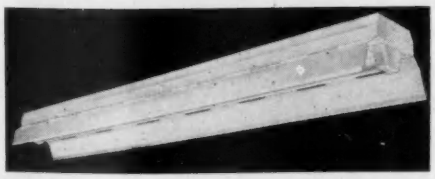
Stearn model 151 fluorescent fitting with open ended reflector



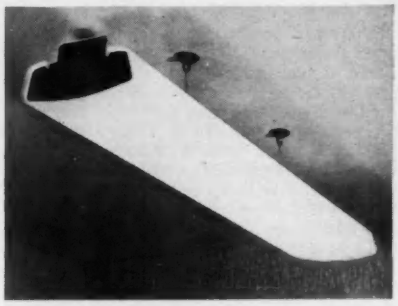


Above: This twin lamp batten fitting from the Siemens Ediswan "Sielect" range is also available as a single lamp version

New Atlas Lighting fluorescent fittings: Above: Series KO "Popular" commercial fitting. Right: Series 1B "Atlantic" range twin-tube fitting



Left: A slotted reflector fitting, one of the new Ekco "Essex" series



Financial Section

STOCKS and SHARES

IN the industrial markets of the Stock Exchange the advance in share price has now not only made good the whole of the depression which followed the crisis measures of last autumn, but has continued upwards beyond the peaks of the 1957 boom to levels within sight of the all-time high points of 1955. On the whole, the Chancellor of the Exchequer's latest review of economic and financial affairs was interpreted favourably, despite his cautionary remarks on the weaker points in the situation. Wall Street has continued vigorously to proclaim the passing of the American trade recession. Both there and in the London market, bouts of profit-taking have been producing occasional checks and minor reverses, but optimism has so far kept well on top.

Higher Prices

Shares of C. A. Parsons and A. Reyrolle came well to the front in the latest advance of the industrial market, the former rising by 3s 9d to 52s 6d, and Reyrolle by 7s 6d to 88s 9d. Plessey were also outstanding with a gain of 7s 6d, to 72s 6d, on the week. G.E.C. moved up to 40s, and there were improvements of 1s 3d in English Electric and A.E.I. The last-named movement was reflected in the price of W. T. Henley's at 19s 3d: holders of the latter have now received the formal offer of the exchange into A.E.I. shares. London Electric Wire put on another 8s to 62s 6d x.d., and have now risen by some 15s since last month's announcement of an increased interim dividend. Gains of one to two shillings were recorded in B.I.C.C., British Thermostat, W. H. Allen, Ward & Goldstone and others, while lesser improvements were widespread. B.E.T. "A" shares advanced still further to 34s 6d after the declaration of a higher interim dividend, and most other shares with commercial television associations remained in high favour.

Pyrotenax Dealings

Demand for Pyrotenax 5s shares, upon their first introduction to the Stock Exchange last week, tested severely the arrangements under which they were marketed, and for a time the scene on the floor of the House was something more than animated, with the price of the shares moving between 27s 6d and over 30s. Later the quotation settled down at around 29s 9d, at which price there is a prospective yield of 4·6 per cent on the basis of the 27½ per cent dividend envisaged by the directors for the year ending next March. A distribution of that amount would be covered some two-and-a-half times over by the average profit of £600,000 earned in the last three years. For 1957–58 the profit before tax was some £62,000 above that average, and in the present year sales are stated to have been rising above last year's level despite increased competition in mineral insulated cables.

New Issues

Two other newcomers entered the market this week through placings of

Price Changes in

Company or Board	Nom. Value	Middle price 20th Oct.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1958 Highest	1958 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	76½		3	3	3 18 6	76½	72
Brit. Elec. 1974/77	100	73½		3	3	4 1 9	73½	68½
Brit. Elec. 1976/79	100	77½		3½	3½	4 10 3	78½	72
Brit. Elec. 1974/79	100	87		4½	4½	4 17 9	87½	82½
Overseas Electric Supply								
Calcutta Elec.	£1	16/6		6·8†	7†	8 9 9†	17/6	15/-
East African Power	£1	23/-		7½	8	6 19 3	23/-	17/6
Nigerian Elec.	£1	14/6		10	10	13 16 0	17/-	12/6
Perak Hydro-Elec.	£1	14/-		12½	10	14 5 9	15/6	13/6
Electrical Shares								
Aberdare Holdings	5/-	13/6	+3d	17½	17½	6 9 9	13/9	9/9
Aerialite	1/-	7/9	−3d	48	51½	6 12 9	8/-	5/1
Allen, W. H.	£1	43/9	+2/-	10	11	5 0 6	43/9	32/9
Anglo-Portuguese Tel.	£1	28/3x.d.		8	9	6 7 6	29/3	19/9
Aron Elec. Ord.	£1	60/-		15	15	5 0 0	60/-	53/-
Assoc Elec. Ord.	£1	55/-	+1/3	15	15	5 9 0	55/-	46/6
Automatic Tel. & El.	£1	70/-		17	17	4 17 3	70/-	57/-
Babcock & Wilcox	£1	54/-x.d.		15	13†	4 16 3	54/6	41/9
Bakelite	10/-	23/-		15	15	6 10 6	23/-	17/6
Baldwin, H. J.	2/-	2/9		20	20	—	3/9	2/6
Berry's Electric	5/-	8/-	+3d	10	10	6 5 0	8/6	5/9
British Aluminium	£1	54/-	+4/9	12	12	4 9 0	55/-	37/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	34/6	+1/-	25	25	3 12 6	34/6	19/6
B.I. Callender's	£1	48/-	+1/6	12½	12½	5 4 3	48/-	38/9
B.I. Callender's 6% Pref.	£1	20/-		6	6	6 0 0	20/3	19/-
British Tabulating	£1	57/6		9	10	3 9 6	57/6	38/6
British Thermostat	5/-	35/3	+1/6	25	30	4 5 0	35/3	19/9
British Vac. Cleaner	5/-	4/3		10	10	5 17 9*	4/3	2/3
Brook Motors	10/-	49/6	−6d	25	25	—	50/-	33/3
Bulgin, A. F.	1/-	7/-		40	45	6 8 6	7/-	4/7
Bulpitts	5/-	9/3		—	12½‡	6 15 3	9/3	7/3
Burco Dean	5/-	9/9		20	22½	7 13 9*	10/-	7/9
Cable & Wireless: Ord.	5/-	12/6		10	10‡*	4 0 0	12/6	8/-
4% Loan	100	94		4	4	4 4 0	94½	89
Chloride El. Storage "A"	£1	65/9	−6d	17½	17½	5 6 6	66/3	55/6
Clarke Chapman	£1	64/3	+6d	27½	27½	4 5 6*	72/6	55/-
Cole, E. K.	5/-	17/6		17½	17½	5 0 0	18/-	15/3
Cossor, A. C.	5/-	5/3		2½	Nil	Nil	6/-	4/4
Crabtree	10/-	31/6	+6d	20	20	6 7 0	31/6	24/4
Crompton Parkinson Ord.	5/-	13/-		16	16	4 2 0*	13/6	8/3
De La Rue	10/-	29/-	+3d	35	17½*	6 0 9	29/-	20/9
Decca "A"	4/-	30/9	+9d	43½	43½	5 13 9	30/9	21/3
Desoutter	5/-	16/6		32½	18½*	5 13 9	16/6	13/6
Dewhurst	2/-	9/-		16½	20	4 9 0	9/-	6/9
Dictograph Tel.	2/-	7/3		20	20*	5 10 3	7/3	4/7
Dubilier Condenser	1/-	3/6		30	20*	5 14 3	4/3	3/1
Duport	5/-	10/9	+3d	25	25	5 16 3*	10/9	7/9
E.M.I.	10/-	47/6	−3d	15	15	—	48/-	27/6
Electrical Components	5/-	9/3		12½	12½	6 15 3	9/9	7/-
Elec. Construction	£1	27/6	+6d	8½	8½	6 3 9	27/6	21/-
Elliott-Automation	5/-	19/3	+3d	—	10‡	2 12 0	19/9	11/6
Enfield Cable Ord.	£1	18/-	−9d	Nil	2½	2 15 6	18/9	10/9
English Electric	£1	60/-	+1/3	14	14	4 13 3	60/-	44/-
English Electric 3½% Pref.	£1	12/6		3½	3½	6 0 0	12/6	11/9
Ericsson Tel.	5/-	25/3		22†	12*†	2 7 6†	25/3	17/6
Ever Ready	5/-	21/3	+3d	37½	20*	4 14 0	21/3	13/9
Falk Stadelmann	£1	45/6	−9d	17½	17½	7 13 9	46/3	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

part of the ordinary capital of Arcolectric (Holdings) and Kango Electric Hammers. Capital of the former company is £83,500, divided into 1s shares, in which early dealings took place at prices around 1s 9d. Assuming at least the maintenance of profits at the recent level of £62,000, it is the intention of the directors to recommend a dividend of not less than 15 per cent for the 1958–59 period, so that the indicated yield on the shares is a fraction over 8½ per cent. Kango Electric Hammers have a capital of £180,000 in 4s shares. Estimating a profit of not less than £84,500 for this year, the directors forecast a final dividend of 7½ per cent, to make a total of 12½ per cent. This would produce a yield of 10 per cent on the shares at the price of about 5s at which initial transactions took place.

Electrical Investments

Company or Board	Nom. Value	Middle price 20th Oct.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	40/-	+1/9	12½	10	5 0 0	40/-	29/3
G.E.C. 6½% Pref.	£1	21/3	+3d	6½	6½	6 2 3	21/3	20/3
General Cables	5/-	9/9		30	24	—	11/9	8/3
Greenwood & Batley	£1	52/6	+2/-	17½	20	7 12 6	52/6	45/-
Hackbridge Holdings	5/-	14/3	+6d	20	20	7 0 3	14/3	7/6
Hackbridge & Hewittic	5/-	14/6	+3d	20	20	6 18 0	14/6	9/7
Head Wrightson	5/-	23/9	+1/-	22½	17½*	3 13 9	23/9	16/9
Heatrae	2/-	7/-		15	20	5 14 3	7/-	4/-
Henley's	10/-	19/3	+6d	11½	11½	5 19 6	19/3	10/6
Holophane	5/-	14/6		37½	22½*	7 15 3	15/3	12/6
Hoover	5/-	49/6		50	50	5 1 0	49/6	31/-
I.C.I.	£1	34/-		10	12	4 14 3*	35/-	23/9
Intl. Combustion	5/-	27/6		22½	25	4 11 0	27/6	19/3
Johnson & Phillips	£1	22/6	+1/3	10	5	4 9 0	25/-	15/-
Lancashire Dynamo	£1	40/-		11	11	5 10 0	40/-	28/6
Laurence Scott	5/-	16/9		15	15	4 9 6	16/9	12/6
Lister, R. A.	£1	31/-	+1/-	10	10	6 9 0	31/-	23/-
London Elec. Wire	£1	62/6x.d.	+8/-	12½	12½	4 0 0	63/-	39/6
Lucas, J.	£1	39/6		7½	7½	3 16 0	40/-	27/9
Marconi Marine	£1	36/3		10	10	5 10 3	36/3	29/-
Marryat & Scott	2/-	7/6		35	37½	5 0 0*	7/7	5/3
Mather & Platt	£1	46/3	+6d	15	15	4 6 6*	46/3	29/6
Metal Industries	£1	42/3	+2/-	9	14	6 12 9	42/3	22/9
Midland Elec. Mfg.	£1	58/9		12½	12½	4 5 0	58/9	44/-
Morphy-Richards	4/-	18/9		20	20	4 5 3	19/-	14/6
Murex	£1	56/3		20	17½	6 4 6	59/3	48/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/9	2/3
Oldham & Son	1/-	3/-		17½	17½	5 16...9	3/-	2/3
Parsons, C. A.	£1	52/6	+3/9	8½	7½*	2 17 3	53/6	43/-
Plessey	10/-	72/6	+7/6	30	30	4 2 9	72/6	55/-
Pye "A" Deferred	5/-	16/-		12½	12½	3 18 3	16/-	10/-
Pyrotenax	5/-	29/9		—	27½‡	4 12 6	30/6	27/6
Reyrolle	£1	88/9	+7/6	17½	17½	3 19 0	88/9	73/6
Rheostatic	4/-	7/-		12½	12½	7 2 9	8/-	6/-
Richardsons Westgarth	10/-	15/3		16⅔	8⅓*	5 9 3	15/9	13/-
Scottish Cables	4/-	11/9		27½	27½	5 8 9*	11/9	7/-
Simon-Carves	5/-	29/-	+6d	20	25	4 6 3	29/-	22/6
Smith (England), S.	4/-	10/3		17½	20	3 18 0*	10/3	7/-
Southern Areas	£1	12/-	−3d	7½	Nil	Nil	13/9	9/3
Strand Elec.	5/-	7/9		15	15	9 13 6	7/9	4/9
Sturtevant	5/-	15/9		15†	15†	4 15 3†	18/-	14/9
Sun Elec.	£1	57/6		25	25	8 13 9	60/-	47/3
Switchgear & Cowans	5/-	17/9		25	22½	6 6 9	17/9	8/9
Taylor Tunnicliff	5/-	16/9		15	17½	5 4 6	16/9	11/9
T.C.C.	10/-	35/-		25	25	7 2 9	38/6	32/6
T.C. & M.	£1	29/9	+6d	8½	8½‡	5 14 3	30/-	20/-
Telephone Mfg.	5/-	5/9		10	10	8 14 0	5/9	4/6
Telephone Rentals	5/-	12/3		12½	12½	5 2 0	13/6	9/9
Thompson (John)	5/-	26/6	+6d	25	25	4 14 3	27/-	23/-
Thorn Elec. "A"	5/-	22/6		17½	17½	3 17 9	23/3	17/-
Thornycroft	£1	30/9	+9d	12½	12½	8 2 6	30/9	21/-
Tube Investments	£1	71/3x.d.	+2/3	15	17½	4 18 3	71/3	48/3
Vactric	5/-	27/3	+1/3	25	25	4 11 9	27/3	14/3
Veritys	5/-	5/3		12½	2½	2 7 6	6/9	5/3
Walsall Conduits	4/-	16/9		20	22½	5 7 6	16/9	11/-
Ward & Goldstone	5/-	33/6	+2/6	40	25*	3 14 9	33/6	23/6
Watford	2/-	7/3		25	25	5 10 3*	7/3	4/-
Westinghouse	£1	42/6		18	10*	4 14 3	42/6	32/3
West, Allen	5/-	14/-		15	12½*	4 9 3	14/-	9/3
Wolf Electric	5/-	8/9		20	20*	5 14 3	9/-	6/9

Crompton Parkinson

There has been activity, at rising prices, in the 5s shares of Crompton Parkinson in advance of the final dividend declaration and the preliminary profits statement covering the year ended in June. The announcements are expected to be made known at the end of next week. The quotation has been marked up from 11s 6d to 13s within the past few weeks. Since the distribution of dividends totalling 16 per cent for 1956–57, the company has made a one-for-two scrip issue and paid a 5 per cent interim dividend on the larger capital. This represented an increase on the corresponding previous rate, but was not to be taken to imply a bigger total for the year. A distribution of the same amount as before would mean a rate of 10⅔ per cent on the present capital, and on that basis the yield on the shares is about 4½ per cent.

B.V.C. Issue

At 4s 3d, the 5s ordinary shares of the British Vacuum Cleaner company are now quoted ex-the 100 per cent scrip issue. In announcing this operation last month, the directors stated that it was not possible to estimate at all accurately the profits for the year ended in September, but were definite in advising shareholders not to expect an increase in the amount distributed in the dividend. They added that although benefits from a major reorganisation of the business, and from the development of new projects, might not be reflected to any great extent in the results for 1958–59, these should make a substantial difference to the earnings of subsequent years, given normal trading conditions. Results for 1957–58 will be due to appear in April. Assuming a dividend of half the 10 per cent rate paid last time on £300,000 capital, the yield on the shares is a little under 6 per cent.

Christy Bros. Report

The £1 shares of Christy Bros. have been well supported since the appearance of the annual report for the year ended in March. At a price of about 23s they offer a yield of over 6 per cent on the basis of the 7 per cent dividends paid for each of the last seven years, in the latest of which earnings were equivalent to 25 per cent on the £250,000 ordinary capital. Credit for the improvement in the 1957–58 profit to £37,000 (after tax) was given largely by the chairman to the contracting departments, which were said to have large electrical and other industrial installations in hand, and he spoke well of progress in the group's other varied activities.

REPORTS and DIVIDENDS

W. T. Henley's Telegraph Works Co., Ltd.—The stockholders have now received full particulars of the offer made for their holdings by Associated Electrical Industries, Ltd., the terms of which were reported in our issue of 10th October. The offer, which is conditional upon acceptance by the holders of 90 per cent of the preference and ordinary stock, is recommended by Henley's directors for acceptance. Copies of the announcement have been sent to the A.E.I. stockholders for their information.

Simon-Carves, Ltd., has made an offer to acquire the whole of the issued capital of Lodge-Cottrell, Ltd., and the board of Lodge-Cottrell is recommending the offer to its shareholders for acceptance. If the offer is accepted, it is intended to preserve the name of Lodge-Cottrell and to operate the company as a separate entity within the Simon-Carves organisation. The present Precipitation Division of Simon-Carves will continue to operate independently and will remain competitive in this field.

Arcolectric (Holdings), Ltd.—Application has been made to the London Stock Exchange for permission to deal in and for quotation for the whole of the share capital. The company, formerly Pattani Tin, Ltd., which ceased trading in 1950, recently purchased the whole of the issued share capital of Arcolectric (Switches), Ltd., for £225,000, satisfied as to £175,485 in cash and £49,515 by the allotment of 990,300 ordinary shares of 1s each. Of the cash portion, £143,500 remains outstanding as an unsecured liability, to be discharged at the discretion of the directors as and when the company's financial resources and the payment of dividends permit.

Kango Electric Hammers, Ltd.—Application has been made to the London Stock Exchange for a quotation for the £180,000 ordinary capital in 4s shares. Of the 900,000 shares in issue, 250,000 are being placed at 4s 3d per share, leaving 594,500 shares in the hands of the directors, the widow of the late chairman, and trustees of the will of the late chairman.

Phœnix Telephone & Electric Holdings, Ltd.—The annual meeting was held on 17th October, Mr. G. F. Shipman (chairman) presiding. In his statement, which had been previously circulated, the chairman said that a substantial portion of the group's output was supplied to the Post Office, whose policy of reducing orders and spreading out deliveries in connection with the "credit squeeze" had adversely affected the group. Another factor was the increase in telephone charges.

As regards the current financial year, he said that the same adverse factors had continued to make themselves felt. However, in the changed economic climate which was developing it seemed reasonable to hope that an improving tendency would gradually develop. As to the future, the directors considered that it would be advantageous if a greater measure of diversification could be achieved, and they were seeking to put that policy into effect.

Sigmund Pumps, Ltd.—The board of Booker Brothers, McConnell & Co., Ltd., announces that Bookers Engineering Holdings, Ltd. (a member of the Booker group of companies), has purchased 90 per cent of the issued share capital of Sigmund Pumps, Ltd., from members of the Sigmund family and from the Industrial & Commercial Finance Corporation. Mr. M. Sigmund, managing director of Sigmund Pumps, Ltd., retains a 10 per cent interest in the company and remains managing director. The new board of Sigmund Pumps, Ltd., will be Messrs. E. N. Robinson (chairman), M. Sigmund (managing director), G. R. Glendinning (secretary), D. W. L. Menzies, C. W. Tyrrell, P. Parker and H. P. Lord.

Thos. W. Ward, Ltd., reports a consolidated profit for the year to 30th June last of £2,599,158, as compared with £2,701,625 for the preceding year. Taxation absorbs £1,425,448, and the net balance is £1,173,710 (against £1,249,002), of which £782,490 is available to the parent company. General reserve receives £400,000. It is proposed to pay a final dividend of 10 per cent and a bonus of 5 per cent, maintaining the distribution for the year at 20 per cent. The balance carried forward is £682,295 (against £608,455 brought in).

The Kalgoorlie Electric Power & Lighting Corporation, Ltd.—After meeting all charges, including £12,500 for debenture interest, the profit for 1957 is £15,003, as compared with a loss of £3,348 for 1956. The deficit carried forward is reduced from £42,630 to £27,627. It is stated that no provision has been made for depreciation, or for a loss of £36,427 on obsolete and redundant plant sold in 1957, pending proposals for a scheme of arrangement and a capital reorganisation now being considered.

The British Electric Traction Co., Ltd., has announced an interim dividend of 10 per cent (against 7½ per cent).

The Ever Ready Trust Co., Ltd., has announced an interim ordinary dividend of 6 per cent, the same as last year.

Hopkinsons, Ltd., are paying an interim dividend of 7½ per cent (against 10 per cent), on doubled capital.

The Greengate & Irwell Rubber Co., Ltd., has declared an interim dividend of 5 per cent (unchanged).

New Companies

Brefcon, Ltd.—Registered 13th October. Capital £100. To purchase or otherwise acquire, maintain, work, supply, sell and deal in plant, machinery, equipment and apparatus capable of being used for the construction, operation and maintenance of the oil refinery and associated power plant to be known as Duque de Caxias which Petrolio Brasileiro S.A. proposes to construct at Rio de Janeiro, Brazil, and to advise on and participate and assist in the construction thereof, etc. The subscribers are: John Thompson, Ltd., Babcock & Wilcox, Ltd., British Thomson-Houston Export Co., Ltd., and Stewarts & Lloyds, Ltd. The above companies shall each, so long as it is a member of the company, be entitled to appoint and remove one director. Regd. office: 66, Queen Street, E.C.4.

S. G. Bowen, Ltd.—Registered 18th August. Capital £100. Radio, television, electrical and electronic engineers, etc. Directors: S. G. Bowen and D. Burns. Regd. office: 48, Main Street, Cockermouth, Cumberland.

Kingston Electronics, Ltd.—Registered 9th September. Capital £100. Manufacturers of and dealers in all kinds of radio, television, gramophone, electronic and photographic apparatus and equipment, etc. Directors: W. P. Ryan and W. C. Stevens. Regd. office: 27, Ely Place, E.C.1.

Parelco, Ltd.—Registered 8th September. Capital £100. To acquire the business of Paragon Electric Co. carried on by R. A. and F. M. Wallace at Kingston-on-Thames; manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. Directors: R. A. Wallace and Mrs. Frances M. Wallace. Regd. office: 176, London Road, Kingston-on-Thames.

Sefton Electrics, Ltd.—Registered 29th July. Capital £100. Electrical engineers, electricians, etc. Directors: N. Dugdale and G. Dugdale. Regd. office: Dale House, Lower Alt Road, Hightown, Lancs.

Latto Electrical, Ltd.—Registered 28th July. Capital £250. Electrical engineers and general electrical installation contractors, radio and television engineers and service agents, etc. Directors: Mabel M. Latto, Mrs. Joyce V. Latto and R. E. Latto. Regd. office: 64a, Basils Road, Stevenage, Herts.

A. D. Bartlett, Ltd.—Registered 23rd September. Capital £1,000. Radio, television, electrical and electronic engineers, etc. Directors: A. D. Bartlett and Klara J. Lisowin. Regd. office: 86, Cranbrook Road, Ilford.

Cliff Wood, Ltd.—Registered 19th September. Capital £5,000. Agents for, dealers in and manufacturers of electronic and electrical apparatus, etc. Directors: C. Wood (chairman) and Elsie M. Wood. Regd. office: 23, Mytongate, Hull.

James Nott, Ltd.—Registered 18th September. Capital £500. Designers, manufacturers of and dealers in electric transformers, lamination products of all kinds, sound recording machines and equipment, radio and television receivers and accessories, etc. Directors: W. J. C. Nott and Mrs. Joyce M. F. Nott. Regd. office: 71, West Walls, Carlisle.

Bankruptcies

L. J. Wotton, 76, Babbacombe Road, Torquay, radio and electrical engineer.—Receiving order made 7th October on debtor's own petition. Public examination 4th December at the New Town Hall, Torquay.

A. J. L. Fleming, 54, Fore Street, Buckfastleigh, Devon, electrical engineer.—Application for discharge to be heard on 18th November at 4, Elliot Street, The Hoe, Plymouth.

Liquidation

W. E. Partridge (Electrical), Ltd.—Meetings of members and creditors on 6th November at the offices of Poppleton & Appleby, 126, Colmore Row, Birmingham, 3, to receive an account of the winding-up by the liquidator, Mr. R. F. Bendall.

GENERATION AND DEVELOPMENT

Smaller Output Increase

Since the turn of the year the rate of increase in electricity output has slackened and this is again noticeable in the September figures issued by the Ministry of Power. In that month the increase was 2·6 per cent compared with 3·7 per cent in August and 5·1 per cent in July. The chief reason appears to be an easing of the industrial demand, for Boards' sales returns have shown a lower increase recently in the mainly industrial than in the non-industrial areas. A further indication of this trend is given by the published figures for electricity generation by industry: in the five weeks ended 28th September last such supplies totalled 939 million kWh, compared with 1,000 million in the corresponding period of 1957, a decrease of 6·2 per cent. (Railways, transport undertakings, coal mines, gasworks and petroleum refineries are not included in these returns.)

After a period of little change in the total installed capacity, there were additions at three stations in September. At Ferrybridge "B" the new plant consisted of a 100 MW Parsons set and a 760,000 lb/hr Babcock & Wilcox boiler; at Marchwood a 60 MW English Electric set and a 550,000 lb/hr John Thompson boiler; and at Brighton "B" a 60 MW Richardsons Westgarth set. No new plant was installed last month in stations of the two Scottish Boards.

North Eastern Board's Millionth Consumer

The connection of the North Eastern Electricity Board's millionth consumer was marked by a special switching on ceremony performed by Mr. Emanuel Shinwell, M.P. for Easington, on 3rd October at the home of Mr. and Mrs. J. Foley in St. Ives Place, Murton. The estate is one of many that have been built by local authorities in East Durham and the building development has meant considerable work in extending electricity supplies to the thousands of new consumers.

The chairman of the Board, Mr. T. M. Ayres, in introducing Mr. Shinwell, said that the Board was proud of its achievement in having one million consumers in an area of about three million population.

Kent Supergrid Inquiry

The proposal of the Central Electricity Generating Board to erect a 275 kV transmission line between Northfleet and Canterbury was the subject of a public inquiry held last week at Maidstone. The inquiry, which was conducted by Mr. H. W. Grimmitt, Chief Engineering Inspector, Ministry of Power, and Mr. W. A. Devereaux, Senior Planning Inspector, Ministry of Housing and Local Government, lasted two days.

Mr. S. B. R. Cooke, for the C.E.G.B., said the line was needed to augment electricity supplies in North and East Kent where in ten years the demand had risen from 75,000 to 197,000 kW and was expected to reach 350,000 kW by 1963. There were two additional purposes of the proposal: to connect up with the projected cross-Channel cable and to link the nuclear power station at Dungeness, if authorised, with the national grid through a line from Lydd to Canterbury. [An inquiry into this section was opened at Ashford on Wednesday.]

The County Council did not enter an objection to the route from Canterbury to Lower Halstow, Mr. Cooke said, but proposed that the line should then be taken to the north instead of to the south of the Medway towns. This would require a crossing of the Medway estuary with a main span of 4,500ft and towers 533ft high. Though shorter by 2·3 miles, this route would cost over £500,000 more and would delay the scheme by a year.

Mr. N. K. Cooper said the County Council was disappointed that, with modern techniques and research, it was not possible to transmit electricity across country in a more satisfactory way than by overhead cables which changed the character of the landscape. The Council recognised, however, that extra means of transmission were needed and so recommended a route which did less damage.

Mr. Geoffrey Jellicoe, past-president of the Institute of Landscape Architects, gave evidence in support of the northern route which, he said, was through a "mechanical" landscape. He thought that the towers in that area, properly sited, could be inspiring.

On the second day Mr. J. W. R. Adams, county planning officer, said that in a letter to the Council the Ministry of Agriculture had stated that the southern route would probably be 50 per cent more injurious to industry than the northern one.

After the close of the inquiry the inspectors visited the areas.

Mr. Emanuel Shinwell switching on the electric cooker in Mr. and Mrs. Foley's new home

ELECTRICITY GENERATED AND SENT OUT FOR PUBLIC SUPPLY

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Electricity G.B.... ...	2,987	77	259·6	6,646	14	6,664	6,256	24,831
North of Scotland H.E.B. ...	11	—	1·0	21	115	141	139	934
South of Scotland E.B.	220	4	0·1	424	21	445	421	1,473
Total for September, 1958 ...	3,218	81	260·7	7,091	150	7,250*	6,816	27,238
Corres. total for September, 1957	3,551	56	50·5	6,878	174	7,064	6,635	25,692
Inc. or dec., per cent	−9·4	+43·0	+416·0	+3·1	−14·1	+2·6	+2·7	+6·0
Total to date (9 months), 1958 ..	33,000	719	1,569·2	68,962	1,491	70,566	66,364	
Total for corres. 9 months of 1957	32,506	625	307·4	63,044	1,484	64,627	60,711	
Inc. or dec., per cent	+1·5	+15·1	+410·5	+9·4	+0·4	+9·2	+9·3	

* The total figure includes generation by other methods amounting to 9 million kWh.

ELECTRICITY GENERATED AND SENT OUT BY SCOTTISH BOARDS

Board	Totals for September (million kWh)			12 Months ended 30th Sept. (million kWh)		
	1957	1958	Inc. or dec. %	1957	1958	Inc. or dec. %
South of Scotland E.B.						
Generated at Steam Stations ...	415·212	424·535	+ 2·2	5,168·002	5,751·576	+11·3
Generated at Hydro Stations ...	28·130	20·599	−26·8	302·313	293·950	− 2·8
Total generated	443·342	445·134	+ 0·4	5,470·315	6,045·526	+10·5
Total sent out	419·248	421·205	+ 0·5	5,180·979	5,720·292	+10·4
Net import from C.E.G.B. ...	23·343	23·191	− 0·7	436·037	400·261	− 8·2
Net import from N.S.H.E.B. ...	26·104	26·130	+ 0·1	431·147	372·848	−13·5
North of Scotland H.E.B.						
Generated—Water Power ...	115·403	126·260	− 8·6	1,659·693	1,624·798	+ 2·2
Steam	20·967	10·474	+100·2	274·653	234·381	+17·2
Diesel	4·247	4·264	− 0·4	65·322	59·055	+10·6
Total generated	140·617	140·998	− 0·3	1,999·668	1,918·234	+ 4·2
Sold to South of Scotland ...	26·130	26·104	+ 0·9	372·848	431·147	−12·9
Sent out to Areas	104·930	108·463	+ 3·3	1,508·390	1,374·877	+ 9·7

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1954

5952. Metropolitan-Vickers Electrical Co., Ltd.—Saturable core reactance devices. 1st March, 1955. (Addition to 659762.) (803341.)

14692. Morphy-Richards, Ltd.—Electric fires. 13th May, 1955. (803312.)

30792. Siemens & Halske A.G.—Capacitors. 26th October, 1954. (803132.)

37513. Plessey Co., Ltd.—Centrifugal switches. 29th December, 1955. (803420.)

1955

1025. Ferranti, Ltd.—Television timebase arrangements. 12th April, 1956. (803272.)

4631. Micafil A.G.—Coil winding devices. 16th February, 1955. (803162.)

7548. Evershed & Vignoles, Ltd.—Electrical controlling apparatus. 1st March, 1956. (803273.)

9505. National Research Development Corporation.—Electromagnetic devices having variable reluctance. 29th March, 1956. (Cognate application 28544, 6th October, 1955.) (803235.)

12785. Igranic Electric Co., Ltd.—Interlocked electric control circuits. 3rd May, 1955. (803380.)

12800. English Electric Co., Ltd.—Manually operable electrical apparatus. 26th April, 1956. (803428.)

13211. Pyrene Co., Ltd.—Automatically operated electric fire alarms. 7th May, 1956. (803219.)

14379. General Electric Co.—Voltage regulators. 18th May, 1955. (803429.)

16613. Rheostatic Co., Ltd.—Magnetic snap-action electric switches. 4th May, 1956. (803346.)

18916. International Business Machines Corporation.—Transistor computer. 30th June, 1955. (803431.)

20450. General Electric Co.—Electron guns. 14th July, 1955. (803221.)

20616. Compagnie Industrielle des Téléphones.—Electromagnetic devices. 15th July, 1955. (803290.)

22440. Imperial Chemical Industries, Ltd., Thorley, T., and Robinson, R.—Arc welding. 27th July, 1956. (803166.)

23627. General Electric Co., Ltd.—Control systems for electric motors. 7th August, 1956. (803224.)

24850. Eitel-McCullough, Inc.—Electron tubes having ceramic envelopes. 30th August, 1955. (803225.)

26476. British Thomson-Houston Co., Ltd.—Electric motor control systems. 13th September, 1956. (803365.)

28621. Standard Telephones & Cables, Ltd.—Cascade arrangements of magnetic amplifiers and/or transductors in a closed loop system. 7th October, 1955. (803239.) 28622. Current limited rectifying systems employing magnetic amplifiers. 7th October, 1955. (803240.) 28623. Cascade arrangements of magnetic amplifiers and/or transductors. 7th October, 1955. (803241.)

29126. Cox, P. C.—Portable electrical heating appliances. 14th January, 1957. (803329.)

29603. Baermann, M.—Electroacoustic transducers. 17th October, 1955. (803283.)

31642. Reyrolle & Co., Ltd., A.—Arc chutes. 31st October, 1956. (803189.)

31649. Telefonaktiebolaget L. M. Ericsson.—Electric direction couplers. 4th November, 1955. (803435.)

32300. Babcock & Wilcox, Ltd.—Vapour generators. 8th November, 1956. (803382.)

32962. General Electric Co., Ltd., and Griffith, G. W. S.—Electric amplifier arrangements. 12th November, 1956. (803349.)

36860. United Kingdom Atomic Energy Authority.—Extraction of metals from aqueous solution. 17th December, 1956. (803264.)

37495. General Electric Co., Ltd., and Fairbairn, E. P.—Feeders for aerial systems. 31st December, 1956. (803350.)

1956

105. Ericsson Telephones, Ltd.—Audio frequency amplifiers. 1st January, 1957. (803396.)

469. Schmidt G.m.b.H., K.—Method of electrolytic oxidation of aluminium alloys. 5th January, 1956. (803357.)

3005. United Kingdom Atomic Energy Authority.—Mass spectrometers. 16th January, 1957. (803168.)

6089. Siemens-Shuckertwerke A.G.—P-n junction rectifier or p-n junction transistor assemblies. 27th February, 1956. (803295.)

6619. Clang, Ltd., Austen, H. E., and Harwood, C. D.—Snap-action electric switches. 28th February, 1957. (803314.)

11034. British Thomson-Houston Co., Ltd.—Limit switches for winders. 18th March, 1957. (803280.)

12653. Chloride Batteries, Ltd.—Electric accumulators. 1st April, 1957. (803400.)

12944. Comptoir de l'Industrie Contonniere, Etablissements Boussac.—Detectors of electrically conductive bodies in continuously travelling strip material. 27th April, 1956. (803171.)

16861. Philips Electrical Industries, Ltd.—High-frequency power supply arrangements. 31st May, 1956. (803352.)

17339. Western Electric Co., Inc.—Methods of controlling the surface characteristics of semiconductor devices, and semiconductor devices having controlled surface characteristics. 5th June, 1956. (803298.)

17529. Onderzoekingsinstituut Research N.V.—Process for treating products having a low electric conductivity to reduce their tendency to electrostatic charging. 6th June, 1956. (Addition to 791476.) (803174.)

19905. General Electric Co.—Organo-silicon dielectric materials. 27th June, 1956. (803150.)

21010. Philips Electrical Industries, Ltd.—Circuit arrangements for the selective detection of oscillations of given frequency. 6th July, 1956. (803299.)

21350. Ray, R. J., and Ray, N. E.—Apparatus for electrically heating liquids. 10th July, 1956. (803450.)

21804. Standard Telephones & Cables, Ltd.—Intelligence storage equipment. 13th July, 1956. (803300.)

24891. Metallgesellschaft A.G.—Collecting electrodes for electrostatic precipitators. 14th August, 1956. (803152.)

29444. Allen, C. J.—Switching apparatus for use in transporter rail systems. 26th September, 1956. (803303.)

30632. General Electric Co.—Venting arrangement for clothes dryers and combined washing and drying machines. 8th October, 1956. (803337.)

30751. Foster Wheeler, Ltd.—Direct-fired fluid heater. 9th October, 1956. (803210.)

30879. Babcock & Wilcox, Ltd.—Natural circulation steam generators. 10th October, 1956. (803153.)

31288. Brown, Boveri & Cie. A.G.—Cooling systems for turbo-generators. 15th October, 1956. (803388.)

34296. Standard Telephones & Cables, Ltd.—Telephone transmitters. 9th November, 1956. (803284.)

34658. Pintsch Bamag A.G.—Electrolytic cells. 13th November, 1956. (803197.)

1957

1485. Westinghouse Electric International Co.—Control systems for effecting the energisation of two a.c. load units. 15th January, 1957. (803230.)

9514. Standard Telephones & Cables, Ltd.—Negative impedance transistor oscillator. 22nd March, 1957. (803186.)

21033. Ateliers de Constructions Electriques de Charleroi.—Hand drying apparatus. 3rd July, 1957. (803202.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 1st November:—

AUTOPAK. No. 776,164. Class 7. Electric welding machines.—Rockweld, Ltd., Commerce Way, Croydon, Surrey.

OSPREY. No. 778,655. Class 7. Electric washing machines and parts.—Electric 'O' Appliances, Ltd., 184-186, Victoria Road, Scarborough.

PRESTOLUX. No. 773,898. Class 9. Portable electric vacuum cleaners.—Superlux, Ltd., trading also as Direct Distributing Co., 793, Fulham Road, London, S.W.6.

VARIOPONT. No. 774,796. Class 9. Electrical and electronic apparatus and instruments, etc.—Landis & Gyr Akt.-Ges., Zug, Switzerland. Address for service, c/o D. Young & Co., 10, Staple Inn, London, W.C.1.

SUBMINAX. No. 778,722. Class 9. Flexible electricity conductors and electric connectors.—Amphenol Electronics Corporation, Chicago, U.S.A. Address for service, c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

STELAIR. No. 770,055. Class 11. Electric space heaters of the panel type.—E. W. Griffiths (Pressings), Ltd., Stelcraft Works, Blackheath, Birmingham.

HITEM. No. 777,111. Class 17. Electric insulating material in solid form.—Wandleside Cable Works, Ltd., 106, Garratt Lane, Wandsworth, London, S.W.18.

CATALOGUES AND LISTS

CONDUIT FITTINGS.—Leaflet describing the company's new self-locking adaptor for flexible metallic conduits, which has been designed to overcome the tendency of the conduit to break close to the adaptor.—**Abboflex, Ltd.**, Walnut Tree Close, Guildford, Surrey.

DOMESTIC APPLIANCES. — 39-page catalogue illustrated in colour giving particulars and prices of the company's range of domestic electrical appliances.—**General Electric Co., Ltd.**, Magnet House, Kingsway, London, W.C.2.

EARTH BORING MACHINES.—Illustrated folder describing the "Cheshire-Highway" earth boring machines for the erection of telegraph and distribution poles, etc.—**Cheshire Engineering Co., Ltd.**, Yorktown Works, Camberley, Surrey.

LAMPS.—Illustrated thumb-indexed catalogue (AL.193) covering the "Mazda" range of lamps.—**A.E.I. Lamp & Lighting Co., Ltd.**, Melton Road, Leicester.

28-page catalogue dealing with the company's range of lamps, including tungsten filament, fluorescent and automobile types.—**Ekco-Ensign Electric, Ltd.**, 45, Essex Street, Strand, London, W.C.2.

MACHINE MOUNTS.—Leaflet illustrating and describing the company's level-mounts incorporating anti-vibration pads, for mounting machinery without bolting down.—**Vulcascot (Great Britain), Ltd.**, 87/89, Abbey Road, London, N.W.8.

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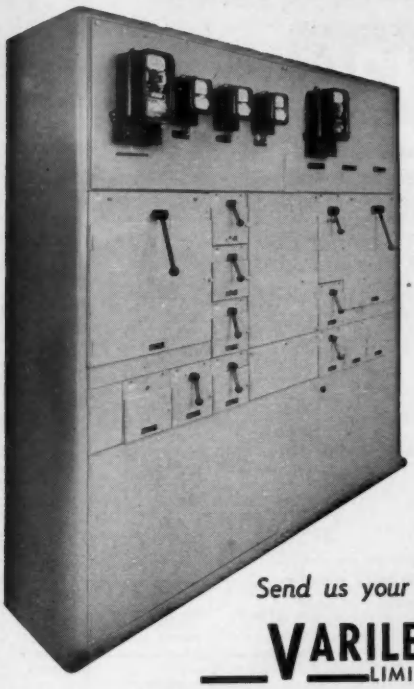

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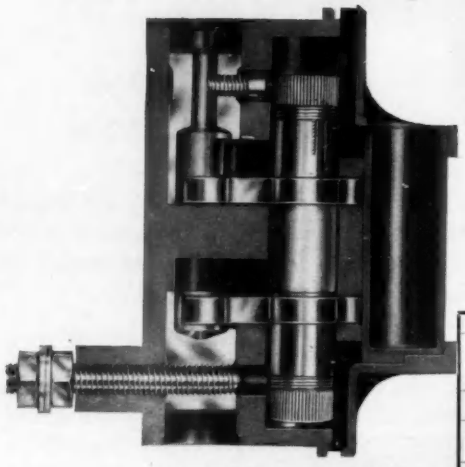

SLYDLOK **'H' TYPE FUSE**

Fuse section shows vibration proof interlock between contacts and terminals, also the shortened bottom terminal which, to protect the operator, keeps the circuit open, upon replacement and removal of the carrier. Terminals are fully shrouded from accidental touch when Holder removed. Facility for sealing. Rewirable and H.R.C.

Performance Data Shown Below is Achieved with ordinary Tinned Copper Fuse Wire.

H. REWIRABLE FUSELINKS—CATEGORY OF DUTY				
Type and Size of Fuselink	A.C.		D.C.	
	250 volt (to B.S. 88)	440 volt 3 P.H. three phase test (not to B.S. 88)	250 volt (to B.S. 88)	500 volt (to B.S. 88)
H.5. FL (5 amp)	4,000 amp. 0·4 P.F. (A.C. 2)	1,000 amp. 0·9 P.F.	—	—
H.15 FL (15 amp.	16,500 amp. 0·3 P.F. (A.C. 3)	4,000 amp. 0·8 amp.	4,000 amp. ·004 T.C. (D.C. 2)	1,000 amp. ·003 T.C. (D.C. 1)
H.30 FL/A (30 amp) 250v.	16,500 amp. 0·3 P.F. (A.C. 3)	— —	4,000 amp. ·004 T.C. (D.C. 2)	—
H.30 FL/B (30 amp) 440v.	—	4,000 amp. 0·8 P.F.	—	—

NOTE: H.15FL and H.30FL/A meet Lloyd's Register requirements

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- ★ Fully reciprocating mechanism—enables handle dial to be turned direct to "FULL" position from "OFF" thus by-passing simmering position.
- ★ Indexed "OFF" and "FULL" positions.
- ★ Rear wiring, shallow projection, 1ER series.
- ★ Rigid wiring terminals. Calibration unaffected during wiring process.
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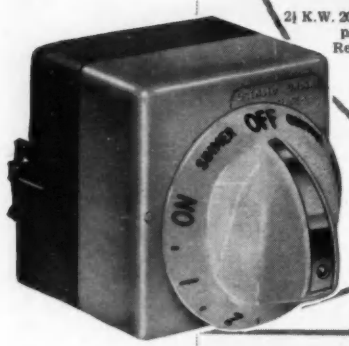
2½ K.W. 200/250 V. AC only, single pole, single stage Energy Regulator fitted with side wiring terminals. Interchangeable with existing types.



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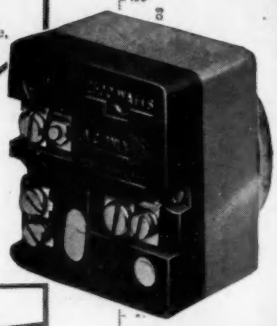

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NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 27th October

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Radio and Measurement Group. "Sceptre Design and Experiment," by R. F. Hemming.

CARDIFF.—South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Centre, Utilisation Group. Section chairman's address, by R. A. Marryat.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "Recent Developments in X-Ray and Electron Microscopy with some Applications to Radio and Electronics," by Dr. W. C. Nixon and C. W. Oatley.

LEEDS.—Fuel Department Lecture Theatre, New Building, Leeds University, 7.30 p.m. Incorporated Plant Engineers, West and East Yorkshire Branch. "Atomic Energy," by R. F. Jackson.

LEICESTER. — East Midlands Electricity Board, Charles Street, 7 p.m. I.E.S. Leicester Centre. "Shop Lighting," by J. R. Just.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Radio and Telecommunication Section. "Rating of Speech Links and Performance of Telephone Networks," by Dr. J. Swaffield and D. L. Richards, and "Assessment of Speech Communication Links," by D. L. Richards and Dr. J. Swaffield.

MANCHESTER. — Manchester College of Science and Technology, Sackville Street, 7.15 p.m. Institution of Production Engineers, North Western Region. "Zeta," by J. Blears.

NEWCASTLE-UPON-TYNE. — Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Operational Experience at Calder Hall," by K. L. Stretch.

NORWICH.—Assembly House, 7.30 p.m. I.E.E. East Anglian Sub-Centre. "Storage and Manipulation of Information in the Brain," by Dr. R. L. Beurle.

STAFFORD.—Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "Results of Full-Scale Stability Tests on the British 132 kV Grid System," by Dr. Ing. F. Busemann and W. Casson, and "The Organisation for Large-Scale Grid System Tests," by Dr. F. H. Last, E. Mills and N. D. Norris.

Tuesday, 28th October

CANTERBURY. — County Hotel, 8 p.m. A.S.E.E. East Kent Branch. Electrical Engineers (A.S.E.E.) Exhibition film.

CARDIFF.—At the South Wales Engineers' Institute, Park Place, 7.30 p.m. Incorporated Plant Engineers, South Wales Branch. "The Clean Air Act and Effluents," by A. S. Minton.

CHELMSFORD. — Public Library, 7 p.m. I.E.E. London Graduate and Student Section. Chairman's address, by J. F. Outram.

LEEDS. — C.E.G.B., 1, Whitehall Road, 7 p.m. I.E.E. North Midland Graduate and Student Section. Members' views on controversial issues.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Measurement and Control Section. Discussion on "Electronic Control of Machine Tools," opened by D. T. N. Williamson.

University of London Institute of Education, Malet Street, W.C.1, 7 p.m. Institution of Electronics, London Division. "Electronic Telephone Exchanges," by Dr. J. E. Flood.

Wellcome Building, 183, Euston Road, N.W.1, 6.30 p.m. Plastics Institute, London and District Section. "Vinyl Chloride Polymers: their Design and Application," by B. S. Dyer.

Manson House, Portland Place, W.1, 6 p.m. Society of Instrument Technology. "Basic Measurements of Time and Frequency," by Dr. L. Essen.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurement and Control Group. Chairman's address, "Digital Computing Machines," by Dr. T. Kilburn.

WORKINGTON.—College of Further Education, 7 p.m. I.E.E. North-Eastern Centre. "Operational Experience at Calder Hall," by K. L. Stretch.

Wednesday, 29th October

CHESTER.—Grosvenor Museum, Grosvenor Street, 7 p.m. Society of Instrument Technology, Chester Section. "Problems in Instrument Manufacture," by C. H. Offord.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South West Scotland Sub-Centre. Sub-Centre chairman's address, by W. Adam.

HALIFAX.—Crown Hotel, Horton Street, 7.45 p.m. A.S.E.E. Halifax Branch. Tape-recording of the A.S.E.E. Diploma Scheme oral examination, followed by a discussion.

HOVE.—New Imperial Hotel, First Avenue, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. "Wartime Espionage Training," by Major Gordon Instone.

LONDON.—Savoy Place, 5.30 p.m. I.E.E. Supply Section. Chairman's address, "Art, Craft and Rampart," by D. P. Sayers.

I.E.E. London Graduate and Student Section. 2.30 p.m. Visit to Marconi-Osram Valve Co., Ltd.

Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker, Sir Frederic Cooper.

A.S.E.E. South West London Branch. 2.30 p.m. Visit to B.B.C. Television Studios, Lime Grove.

London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "Computers and Ferro-electric Storage," by Dr. M. Prutton.

NEWCASTLE-UPON-TYNE. — Bolbec Hall, 7 p.m. North East Coast Institution of Engineers and Shipbuilders, Student Section. Chairman's address, "The Marine Applications of Atomic Energy," by P. A. Milne.

NEWPORT.—Whitehead Institute, 6.45 p.m. Society of Instrument Technology, South Wales Section. "The Art and Craft of Instrumentation," by J. K. Burkitt.

RUGBY.—Rugby College of Engineering Technology, 6.30 p.m. I.E.E. Rugby Graduate and Student Section. "Amplidynes and Amplifiers," by K. D. Stephen.

SHREWSBURY.—Shrewsbury Technical College, Abbey Foregate, 7.30 p.m. Institution of Production Engineers, Midlands Region. "The Russian Machine Tool Industry," by N. Stubbs.

Thursday, 30th October

CHELTENHAM.—Technical College, 7 p.m. I.E.E. Bristol Graduate and Student Section. "Turbine Generators," by G. M. Bayley.

GRANGEMOUTH.—Leapark Hotel, 7 p.m. Society of Instrument Technology, Grangemouth Section. "Control Instrumentation of Nuclear Reactors," by A. B. Gillespie.

LONDON.—25, Foubert's Place, W.1, 2.15 p.m. E.A.W. London Branch. "History of the E.A.W.", by Mrs. G. A. Tatchel.

MAIDSTONE.—Royal Star Hotel, 7.30 p.m. A.S.E.E. East and West Kent Branches. Annual dinner.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, Corporation Road, 7.30 p.m. Society of Instrument Technology, Tees-Side Section. "The Place of Instrument Technology in Control Engineering," by Sir Harold Hartley.

SHEFFIELD. — Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield and District Branch. "Planned Maintenance with particular reference to Breakdowns," by O. L. Pollack.

Friday, 31st October

BIRMINGHAM.—Regent House, St. Philip's Place, Colmore Row, 6 p.m. I.E.S. Birmingham Centre. "Modern Trends in Industrial Lighting," by J. B. Lancaster.

Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "Clean Air Act."

CREWE.—Royal Hotel, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. "Electric Melting Furnaces," by W. L. Harrison.

GLASGOW.—425, Sauchiehall Street, 7.15 p.m. Society of Instrument Technology, Scottish Section. "Control and Instrumentation of a Nuclear Reactor," by A. B. Gillespie.

MANCHESTER.—Reynolds Hall, Manchester College of Science and Technology, 7 p.m. Institution of Electronics, Northern Division. "Modern Developments in Stereophonic Sound," by A. C. Bowyer-Lowe.

NEWCASTLE-UPON-TYNE.—At the Literary and Philosophical Society, 6.15 p.m. North East Coast Institution of Engineers and Shipbuilders. "Nuclear Power for the Propulsion of Commercial Shipping," by Sir John Cockcroft.

NOTTINGHAM.—Welbeck Hotel, 6.30 for 7 p.m. Incorporated Plant Engineers, East Midlands Branch. Dinner-dance.

WEYMOUTH.—South Dorset Technical College, 6.30 p.m. I.E.E. Southern Centre. "Three Weeks in the U.S.S.R.", by Sir Josiah Eccles.

Medical Electronics Study

An interim committee composed of members of the Institution of Electrical Engineers and of the medical profession, having a common interest in medical electronics, discussed at a recent meeting the scope and future activities of the medical electronics discussion group set up by the Council of the Institution. On 7th October an organising committee to be responsible for arranging the programme of the group was appointed, with Mr. S. J. Emerson, M.Eng., M.I.E.E., as chairman, and twenty-four members. It was decided that the activities of the group should be centred round advanced electronic techniques applied or related to medical and biological problems, and there will be a programme of informal discussion meetings which will provide a forum for the exchange of information between the two professions on subjects coming within this field.

The first meeting of the group will be on 7th November (6.0 p.m.) at the Institution, when the subject for discussion will be "Problems in the Measurement of Blood Flow." A second discussion meeting will be held on 28th November at the same time and place on the general topic of the problems which are encountered in the field of neurophysiology. It is also envisaged that a third meeting in January, 1959, should deal with the subject of "The Physiologists' Requirements for D.C. Amplifiers."

A mailing list has been compiled of those who have expressed interest in the group's activities; any person who wishes his name to be included in this list should send this, with his address, to the secretary of the Institution.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Director, Stores and Contracts, Postmaster General's Department, Melbourne. 20th November. Telephone equipment. (E.S.B. 25302/58. Ten/35192.)*

Department of Civil Aviation, Melbourne. 4th November. Transceivers. (E.S.B. 25583/58. Ten/35251.)*

Snowy Mountains Hydro-Electric Authority, Cooma North, N.S.W. 19th November. Main and auxiliary switchgear for T.2 power station. (E.S.B. 25183/58. Ten/35159.)*

Belgian Congo.—Government General, Leopoldville. 31st October. Copper telephone wire. (E.S.B. 25661/58. Ten/35272.)*

Belgium.—Régie de Télégraphes et Téléphones, Brussels. 5th November. Cable and covered wire. (E.S.B. 25120/58. Ten/35227.)*

Blackpool.—Corporation. 21st November. Electric lamps for the year ending 31st March, 1960. (See this issue.)

British East Africa.—Dar es Salaam Municipal Council. 7th November. Mercury vapour lamps and street lighting columns. (E.S.B. 25693/58. Ten/35249.)*

Burma.—Burma Purchase Board, Rangoon. 10th November. Fuseboards, conduit inspection tees and solid bends. (E.S.B. 25426/58. Ten/35201.)*

Edinburgh.—North of Scotland Hydro-Electric Board. Main and auxiliary cabling installation for Orrin power station. Cabling for Cassley power station. (See this issue.)

Formosa.—Central Trust of China, Taipei. 31st October. Electric motors. (E.S.B. 25788/58. Ten/35290.)*

India.—Madras Port Trust. 10th December. 660 V underground distribution cables. (See this issue.)

Iraq.—Basrah Water and Electricity Authority. 1st November. Cables and cable boxes. (E.S.B. 25493/58. Ten/35226.)*

Directorate General of Municipalities, Baghdad. 1st November. Bare hard drawn copper conductors and cable. (E.S.B. 25008/58. Ten/35223.)* Insulators, shackle straps, street lighting lanterns and operation rods. (E.S.B. 25007/58. Ten/35225.)*

New Zealand.—Wellington Corporation. 30th October. P.v.c. covered aerial cable. (E.S.B. 25563/58. Ten/35229.)*

G.P.O., Wellington. 20th November. "Splice-loading" cases. (E.S.B. 25259/58. Ten/35204.)*

Repton.—R.D.C. 26th November. Street lighting equipment. (See this issue.)

Rhodesia and Nyasaland.—Federal Tender Board, Causeway. 31st October. Four 100 kVA and four 50 kVA transformers. (E.S.B. 25026/58. Ten/35151.)*

Bulawayo City Council. 5th November. Insulated cable and sealing ends. (E.S.B. 25143/58. Ten/35147.)* P.v.c. insulated wire and armoured cable. (E.S.B. 25662/58. Ten/35252.)*

Rochester.—City Council. 4th November. Dismantling of approximately 47 gas lighting units and erection of 80 class "B" concrete lighting columns, together with the supply and fitting of equipment, Cuxton Road, Priestfields and Rede Court Road. City Surveyor's Department, 66, Maidstone Road.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

South Africa.—Durban City Council. 31st October. Telephone connecting blocks. (E.S.B. 25219/58. Ten/35168.)* 14th November. Insulated cable and wire. (E.S.B. 25220/58. Ten/35184.)*

Stores Department, South African Railways, Johannesburg. 5th November. Joint sleeves (telegraph line material). (E.S.B. 25795/58. Ten/35277.)* 7th November. Copper wire for overhead track. (E.S.B. 25077/58. Ten/35140.)* 21st November. Automatic radio beacon. (E.S.B. 25071/58. Ten/35145.)*

Union Tender and Supplies Board, Pretoria. 6th November. Universal meters. (E.S.B. 25242/58. Ten/35182.)*

ORDERS PLACED

Durham.—County Education Committee. Electrical work in schools:—Barnard Castle Grammar Technical School (£6,161).—Eastern & Home Counties Electrical Contractors. Spennymoor West Infants' School (£1,607).—Gray Brothers. Stage 2, Bishop Auckland Technical College (£27,098).—North of England Eng. & Elec. Co. Sherburn New Modern School (£6,766).—Devereux Moodie & Co. New lift at Bishop Auckland Technical College (£875).—Electro-Lifts.

Glasgow.—British Railways, Scottish Region. Electric lighting installation, Newton passenger station, yards and new power-operated signal box.—Alexander Lindsay.

London.—South West Metropolitan Hospital Board. Rewiring work at the Royal Richmond Hospital (£19,178).—Wm. Stewart & Co. Power installation at Royal Earlswood Hospital (£8,486).—C. W. Gosling. Electrical work at new boiler house at Springfield Hospital (£1,042).—Requirements Electrical.

Lewisham Housing Committee. Electrical work in 56 maisonnettes, 8 bungalows and 13 garages, Adelaide Avenue (£2,996).—Haines & Shepperd.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Alford (Lincs).—Extensions and improvements at Queen Elizabeth Grammar School (£78,297); county architect, Lindsey County Council, County Offices, Lincoln.

Basingstoke. — Houses (114), Winchester Road area; Reema Construction Co., Ltd., Milford Manor, Salisbury.

Berwick.—Motel (£130,000); Motorinns, Ltd., 178, Piccadilly, London, W.1.

Birmingham.—Headquarters, Edgbaston, for Chamber of Commerce; John H. D. Madin, architect, 83, Hagley Road.

Blackpool.—Pathology block, Victoria Hospital; Lumb & Walton, architects, 19, Clifton Street.

Bristol.—Offices for Burnley Building Society; Eustace H. Button & Partners, architects, 23, Berkeley Square, Clifton.

Chelmsford.—Housing estate, Springfield Place; Percy Bilton, Ltd., 113, Park Street, London, W.1.

Clacton.—Two-storey additions to St. Osyth's Training College (£25,000); A. R. Dannatt & Son, architects, 65a, Duke Street, Chelmsford.

Cranbrook (Kent).—New offices and Council chamber (£32,000); surveyor, Rural Council Offices, Hill House.

Crediton.—Fire station (£21,487); county architect, 97, Heavitree Road, Exeter.

Derby.—Twin operating theatres and pathological department for Royal Infirmary; Sheffield Regional Hospital Board, Fulwood House, Sheffield, 10.

Doncaster.—Civic theatre on former church site, Doncaster Road (£30,000); borough architect, 15, South Parade.

Glasgow. — Three-storey departmental stores, Queen Street, for Littlewood's Mail Order Stores; Keppie, Henderson & Partners, architects, Woodside Place, Glasgow.

Horsham. — Additional accommodation, Collyer's School (£50,000); L. H. Parsons, architect, 13, North Street.

Jarrow.—Houses (82), Charles Street, and near Commercial Road; H. W. T. Perkins, borough engineer.

Kempston.—Special school for educationally sub-normal children (£37,510); county architect, Bedford.

Leeds.—Six-storey showrooms, The Headrow, for Schofields (Leeds), Ltd.; Tripe & Wakeham, architects, 16, Fitzhardinge Street, London, W.1.

Five-storey building for offices and shops, Eastgate; Secretary, National Deposit Friendly Society, 157, Woodhouse Lane, Leeds, 2.

Leicester.—Factory extensions for completion by early 1959; Metal Box Co., Ltd., Loughborough Road, Leicester.

London.—Rebuilding Westbourne Park Baptist Church, Bayswater; Ansell & Bailey, architects, 12, Gray's Inn Square, W.C.1.

Multi-storey flats, Wandon Road, Chelsea; Bridgwater & Shepheard, architects, 42, Bruton Place, W.1.

Block of flats, 26/29, Cliveden Place, Westminster; Griggs & Son, Ltd., builders, 56, Victoria Street, S.W.1.

Block of maisonnettes on site of 9-17, Goldney Road, W.9; W. H. Bentley, town clerk, Town Hall, Paddington Green, W.2.

Loughborough.—Crematorium (£38,000); borough architect, Loughborough, Leics.

Lowestoft.—Administrative offices on the Gordon Road/Clapham Road corner site (£70,000); E. J. Symcox, East Suffolk county architect, County Hall, Ipswich.

Manchester. — Baths establishment (£250,000), Wythenshawe; city architect.

Newcastle-on-Tyne.—College of Further Education (engineering and building), Maple Terrace (£634,000); city architect, 18, Cloth Market.

Newquay.—County secondary school at St. Columb Minor; county architect, County Hall, Truro.

Northfleet.—Houses and flats (60), Painters Ash estate; Drewery F. Bunkall, clerk to U.D.C., Council Offices, Northfleet, Kent.

North Queensferry (Fife).—Houses (43); R. S. Lawrie, county architect, County Buildings, Cupar, Fife.

Peterborough.—Private development of Orchard estate, Werrington, with total of 248 houses; Werrington Investments, Ltd., Werrington, Peterborough.

Home for aged sick, Alderman's Drive (£40,000); city architect.

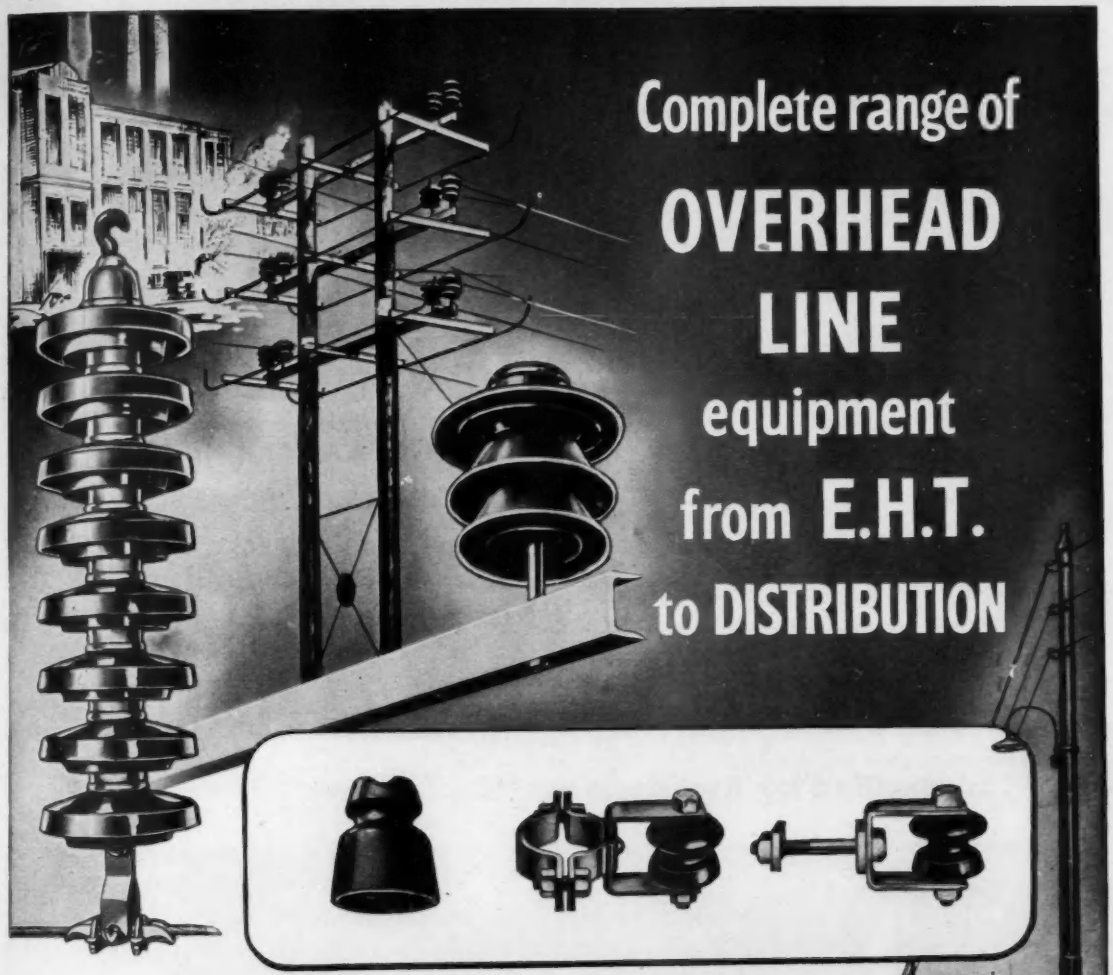
Rochdale.—College of Further Education; York, Rosenberg & Mardall, architects, 2, Hyde Park Place, London, W.2.

Rotherham.—Houses (246); Frank Haslam, Ltd., Doncaster.

Shrivenham (Berks.).—County primary school at Watchfield; county architect, Wilton House, Parkside Road, Reading.

Staveley.—Further 80 houses; U.D.C. surveyor, Staveley, Derbyshire.

Stockton-on-Tees.—Houses (300), Hardwick and Albany estates; T. C. Hartley, borough architect, 28, The Square.



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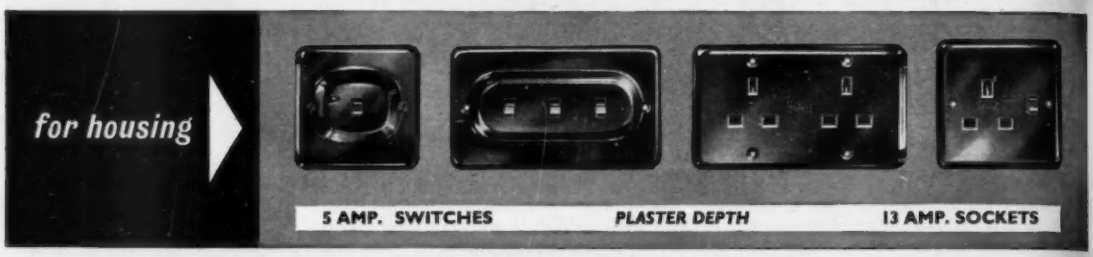
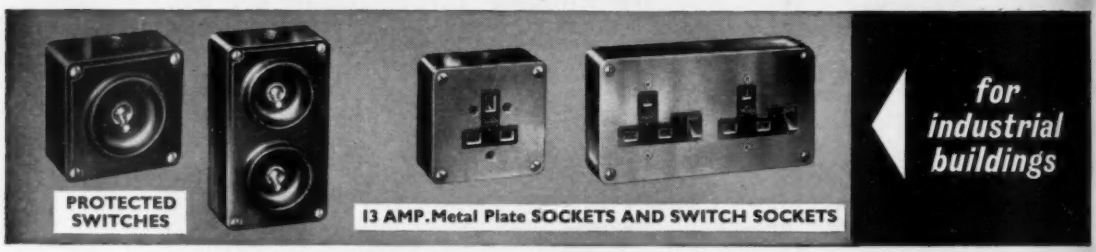
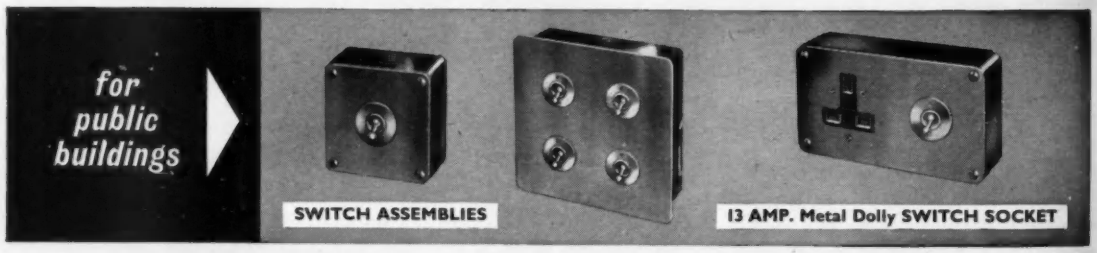


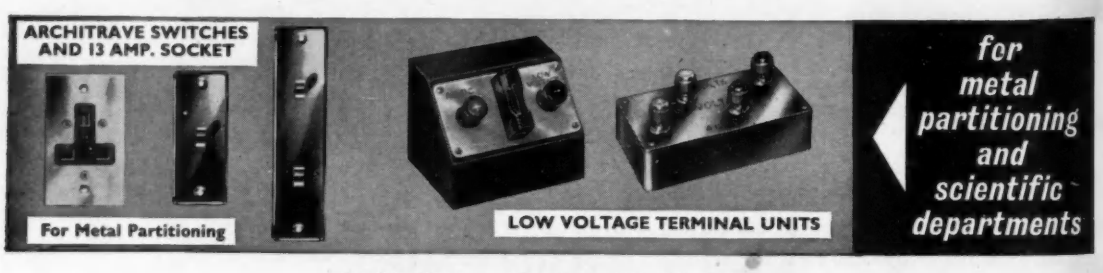
... used by Public Authorities and Government Bodies



... specified by Architects and Consultants



... approved by Contractors everywhere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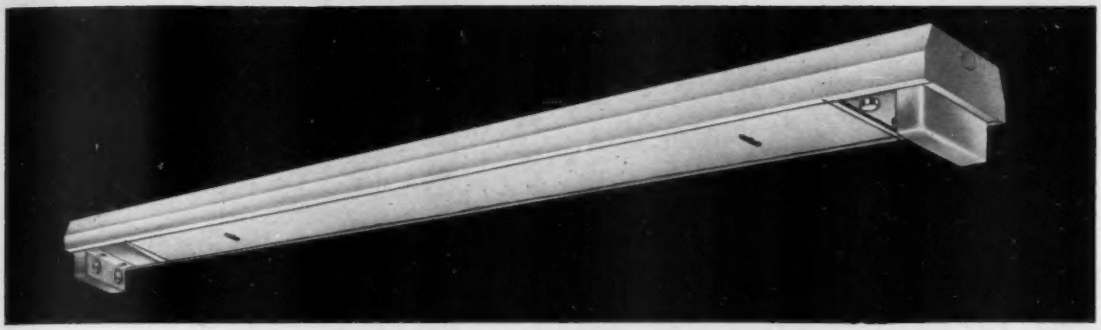

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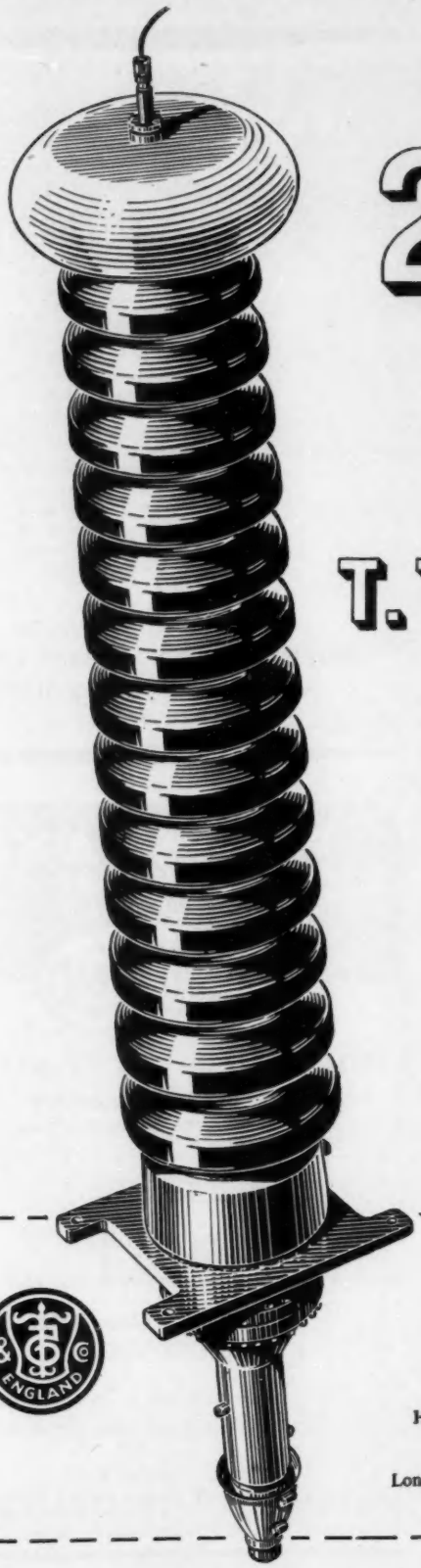

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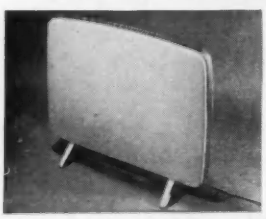

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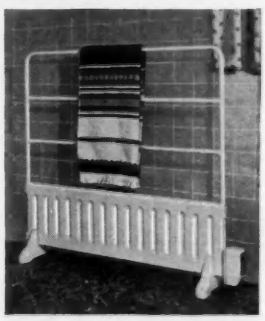

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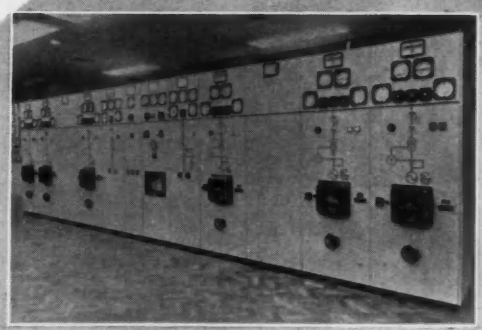

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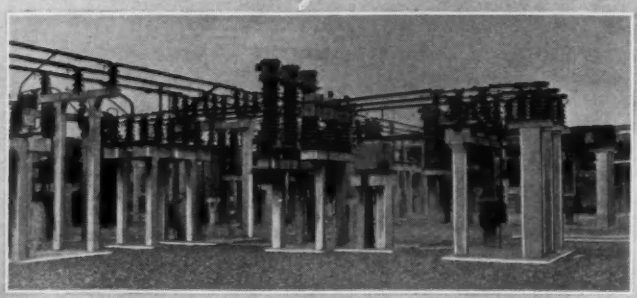

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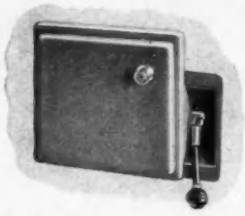

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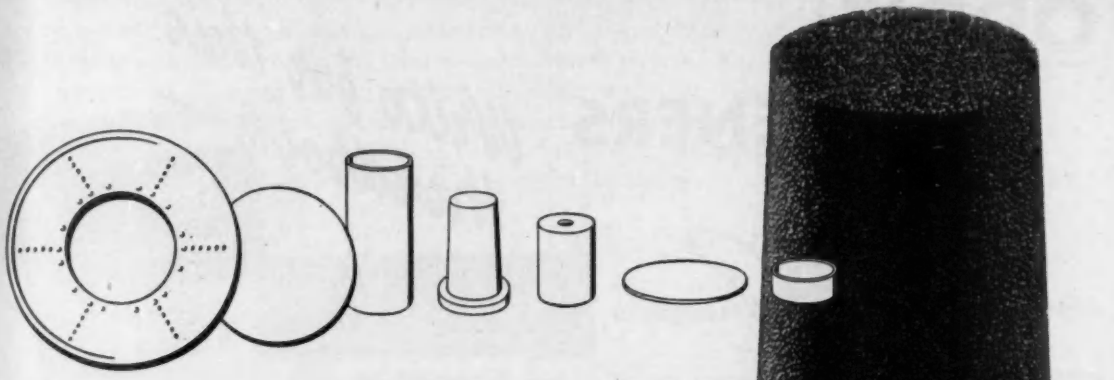

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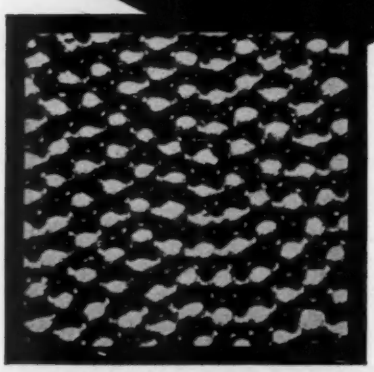

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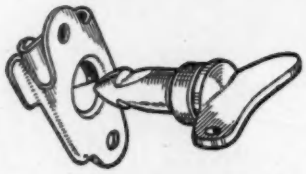

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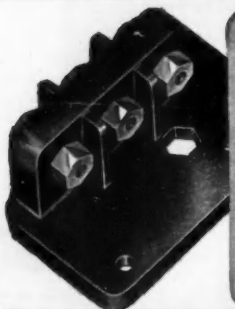

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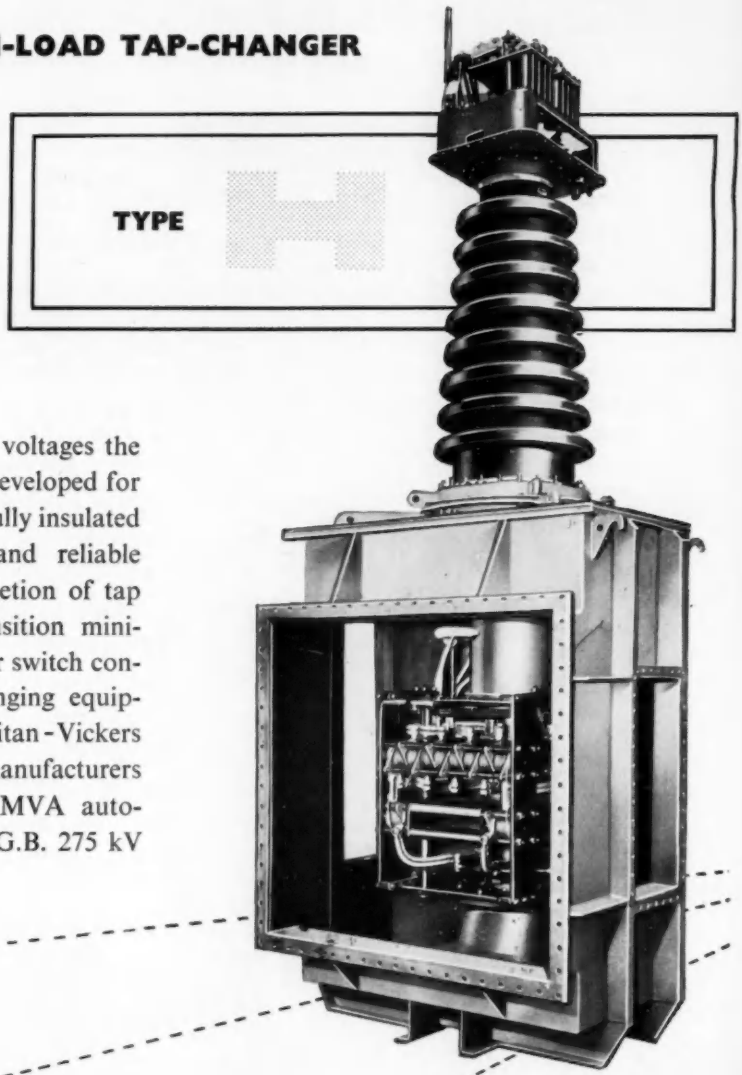

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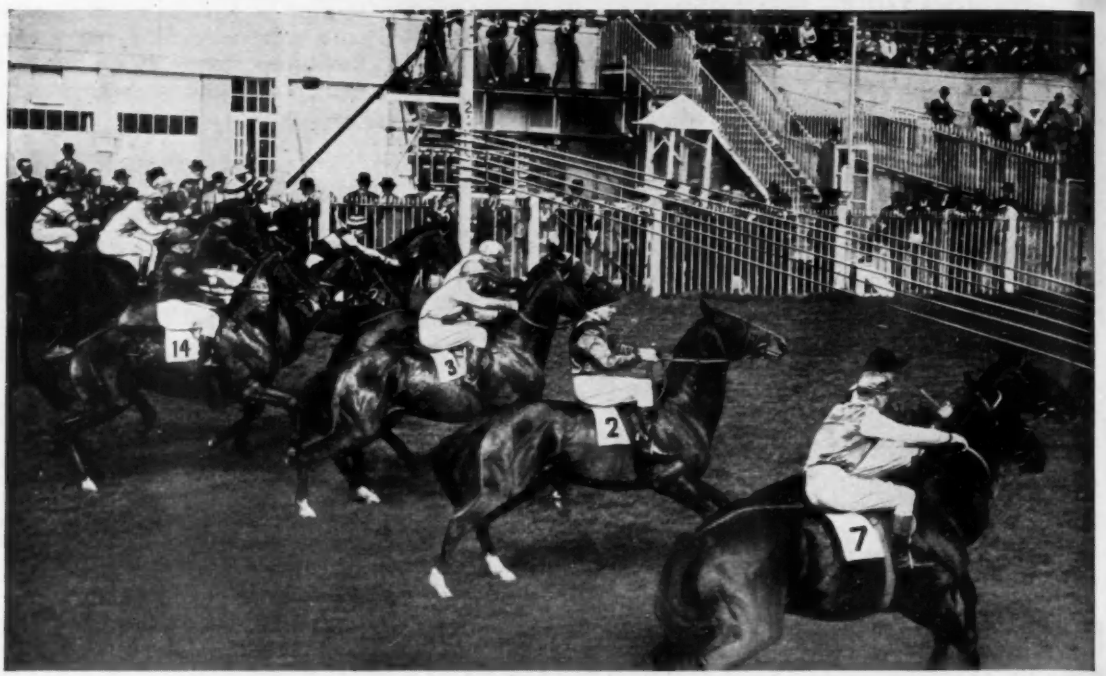

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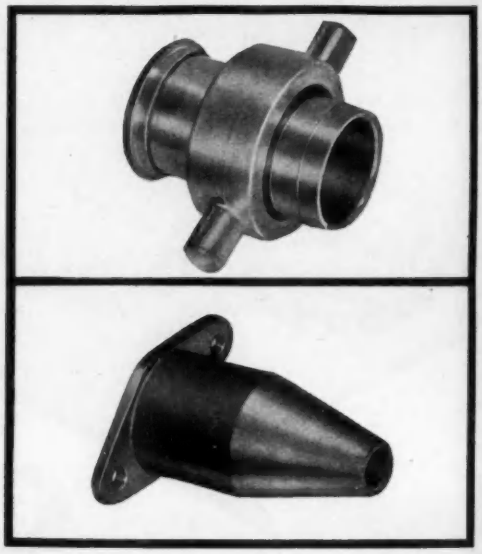
When choosing between Die Castings or Hot Pressings you can count on us for sound, unbiased advice. We make both HOT PRESSINGS in *Brass, Bronze, Copper or Aluminium,* and GRAVITY DIE CASTINGS in *Brass, Bronze or Aluminium.* The unique experience of our organisation . . . two separate yet inter-related operations under one roof . . . will ensure that your choice is correct.

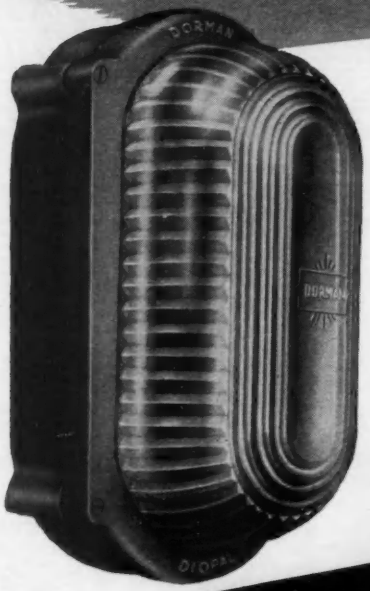
For a constant or phased supply of DIMENSIONALLY ACCURATE PARTS in *Brass, Bronze, Copper or Aluminium* — see us first! Our Technical Representatives are always at your service.



BRASS PRESSINGS (LONDON) LTD.
THE NON-FERROUS DIE CASTING CO. LTD.

NON-FERDICA WORKS, NORTH CIRCULAR ROAD, LONDON, N.W.2
Tel.: GLAdstone 6377

1732



to-day's brightest prospect

DORMAN

DIOPAL

DIOPAL The competitive fitting designed to meet the demand for a medium priced prismatic lighting fitting combining the required essentials with excellent appearance. The opalescent prismatic glass gives wide light dispersion and the body and frame are die-cast from high quality aluminium alloy (L33) which is anti-corrosive. The frame incorporates an asbestos gasket to exclude dust and water.

TILTED DIOPAL The tilted DIOPAL is a further development of the popular DIOPAL and has been designed to give maximum downward light dispersion. The prisms are specially moulded and contoured to direct the light 15° downwards from the horizontal. Other features of this fitting are as the standard DIOPAL.

DIOPAL fittings are specially designed for lighting corridors, stores, stairways, archways, garages, platforms, and similar buildings.

DORMAN & SMITH LTD.

PRESTON Atherton Works, Blackpool Road, Preston, Lancashire Tel: PREston 86785 (6 lines)

LONDON 125 High Holborn, W.C.1 Tel: CHAncery 6431

BIRMINGHAM 2/3 Graham Street, Birmingham 1. Tel: CENtral 2009

GLASGOW 249 St. Vincent Street, Glasgow, C.2. Tel: CENtral 2479

To DORMAN & SMITH LTD., Atherton Works, Blackpool Road, Preston, Lancashire.

Please send latest Lighting Fittings Catalogue

NAME .....

POSITION .....

FIRM .....

ADDRESS .....

ER/10/58

Take no chances-use

ROTUNDA

INSULATING TAPES

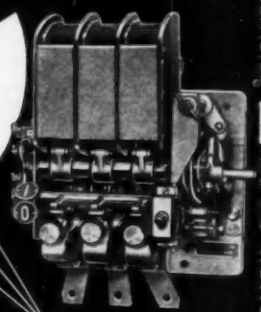
ROTUNDA LIMITED • DENTON • MANCHESTER

FOR *every* SWITCHGEAR

IN POWER STATIONS

ON SHIPS

IN FACTORIES



HUNDTWEBER-
AUTOMATIC AIR CIRCUIT BREAKER

100 - 2000 Amps / 500 Volt A.C. 440 Volt D.C. according to BSS, ABS, VDE, Write for Lists in English to

HUNDT & WEBER GMBH. P.O. BOX 969 GEISWEID, KR. SIEGEN (W. GERMANY)

FOR ANYTHING IN **MICA**
MICANITE
BAKELITE

Moulding, Commutator, Flexible, Heat-resisting Qualities, Commutator Rings, Spools, Tubes, etc.

Mouldings of any shape or form, Tubes, Plates, Washers, Sheets in all thicknesses, etc.

Natural in all Grades and Qualities, Stove Micas, Plates, Washers, Commutator Segments, Condenser Films, etc.

Send to the Manufacturers:

THE BIRMINGHAM MICA CO. LTD.

South Road • Hockley • Birmingham

Phone: Northern 5631/2 *Telegrams: "Insulation, Phone, Birmingham"*

Studding · Studs · Allthreads · Tie Rods

TELCO LTD., 3 Newman Street, London, W.1 MUSeum 5701/4

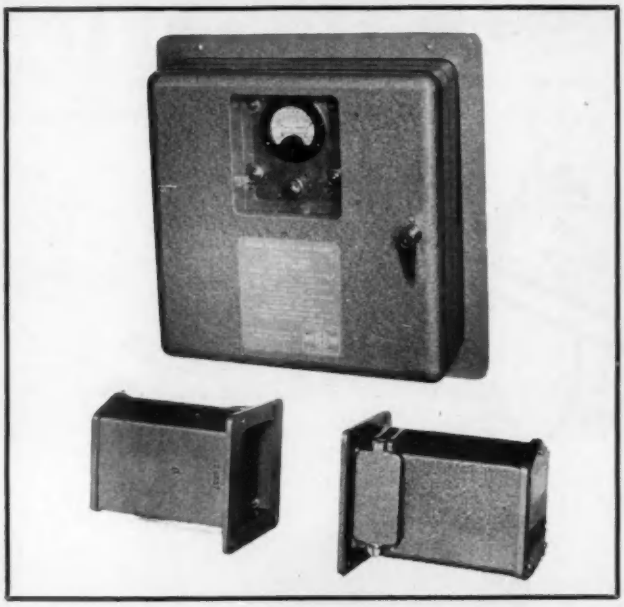
New Smoke Densitometer and Alarm complies fully with British Standards

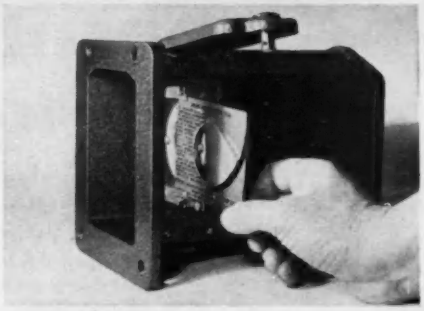
The Clean Air Act of 1956 calls for limitation of the emission of dark smoke (No. 2 Ringelmann or darker). This new Lancashire Dynamo smoke densitometer and alarm is not only an economical alarm unit which will ensure compliance with the Act but, by the addition of an indicator or recorder unit, it becomes a smoke densitometer for better combustion control and lower fuel costs.

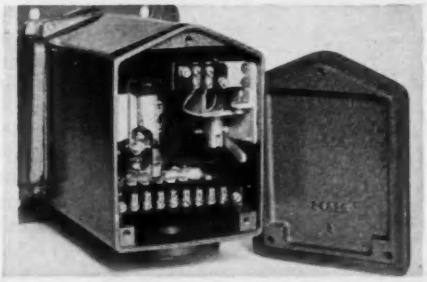
This equipment is the first of its kind to carry the British Standards Institution's "Kite Mark", which indicates independent certification of compliance with BS.2740/56 or, plus the appropriate indicating instrument, with BS.2811/57.

Note these Features

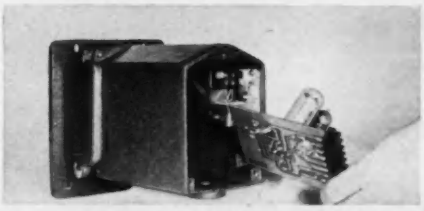
- **WEATHERPROOF CAST IRON HEAD UNITS WITH STAINLESS STEEL FITTING AND EASY ACCESS FOR LENS CLEANING.**
- **FULLY SERVO STABILISED LIGHT SOURCE PLUS "FAIL TO ALARM" CIRCUITS FOR CONSISTENT OPERATION.**
- **FULL RANGE OF ACCESSORIES INCLUDING CHIMNEY AND FLUE FITMENTS, INDICATORS, RECORDERS, ALARM BELLS AND HORNS, LENS CLEANING BLOWERS, SPECIAL CABLING AND MANY OTHERS.**

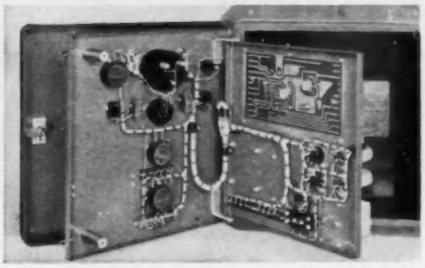






Calibration check by manual insertion of check slide or, in lower illustration of head with remote standardising unit, by push button from main unit.





Printed circuit in main unit and head for ruggedness. Head unit circuit easily removed without disturbing mounting of unit on stack.

LANCASHIRE DYNAMO ELECTRONIC PRODUCTS LTD

ELECTRONIC BEP EQUIPMENT

RUGELEY, STAFFORDSHIRE, ENGLAND

Manufacturers of Britain's widest range of industrial electronic equipment

One of the Lancashire Dynamo Group of Companies

103

are ALL your lamps earning their keep?

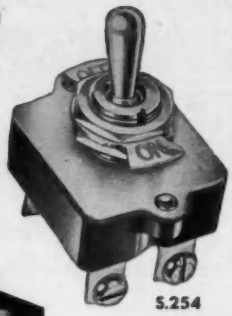
How long is it since you checked your lighting bills against your lighting *needs?* It is quite possible that you are wasting money because some of your lamps are not in the best position or in the most suitable lighting fittings to give you the best and most economical result. A planned lighting layout can often give you better lighting without increased running costs. That's just one example of the help you can get from the Siemens Ediswan advisory service—who will help you to put every lamp where it can really earn its keep. The range and variety of Siemens Ediswan lamps is very wide indeed. Only an expert who knows the range from end to end can say whether you are using the best and most economical lamp in every situation. So don't battle alone. If you have a lighting problem that defeats you our free advisory service is ready to help you to victory without making a charge! Its assistance is free to all who wish to join the Brighter Light Brigade.

Join the brighter light brigade

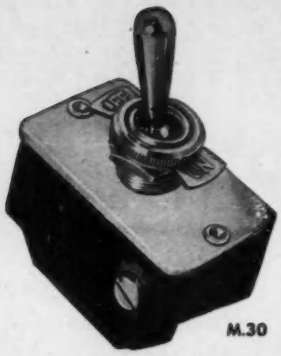
SIEMENS EDISWAN

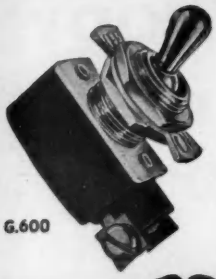
SIEMENS EDISON SWAN LTD. *AN A.E.I. COMPANY*
Lamps and Lighting Division, 38/39 Upper Thames Street, London, E.C.4, and branches. Telephone: CENtral 2332
CRCII/30

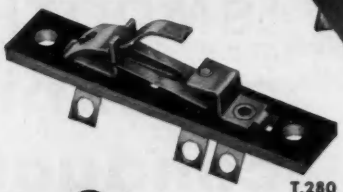
Arcolectric Switches

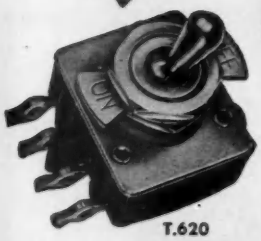


S.254

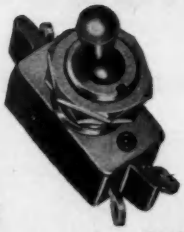

M.30


G.600


T.280



T.620


T.612

S.930

M.30	10-AMP switch for electric fires
S.254	Double pole 10-AMP switch, A.C. only
T.280	Sensitive snap action switch
G.600	3-AMP toggle switch
T.620	Double pole 3-AMP toggle switch
T.612	3-terminal S.P. change-over switch
S.930	Door switch, for refrigerators

Write for Catalogue No. 131

ARCOLECTRIC SWITCHES · LTD

CENTRAL AVENUE, WEST MOLESEY, SURREY. Tel.: MOLESEY 4336

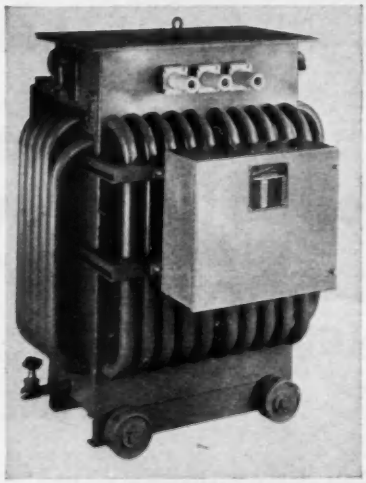
WILLESDEN TRANSFORMER COMPANY LTD.

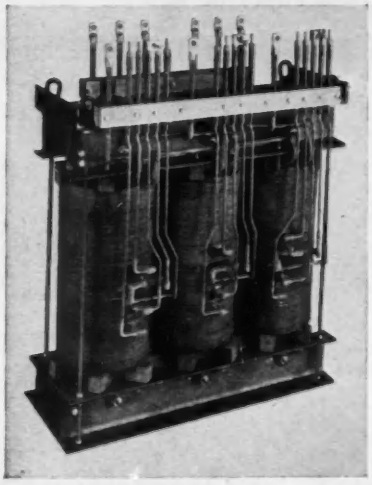
123 kVA max. Rectifier Transformer

Primary : 415 volts 3 phase 50 cy delta connected with tappings for ± 2½ and 5% Sec. variations.

Secondaries : Two separate windings each 189 volts 3 phase 180 amps star connected for feeding 3 wire rectifier equipment.

Air Cooled and Oil Immersed Transformers up to 500 kVA



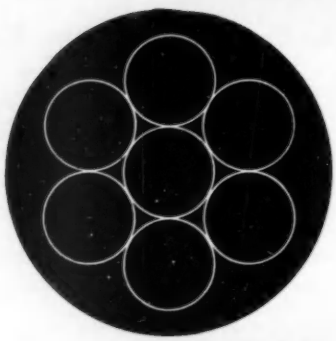


A solution to your Transformer problems

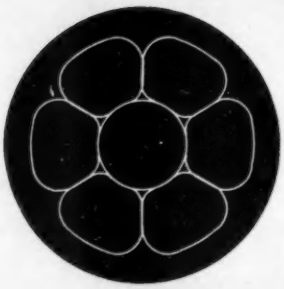
Our Technical Sales Dept. is always at your service for consultation and quotations

MANOR PARK WORKS, MANOR PARK ROAD, LONDON, N.W.10 Elgar 5445-6

STERLING insulated 'SMOOTH BODY' aluminium conductors



conventionally-stranded conductors



Sterling "Smooth Body" Aluminium Conductors

show substantial reductions in

SIZE.....8-9%
WEIGHT..10-12%
AND OF COURSE, PRICE

STERLING

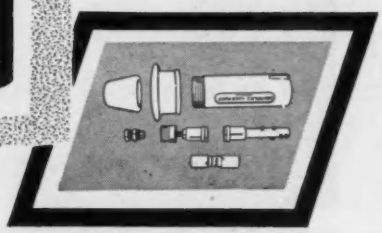
STERLING CABLE COMPANY LIMITED · ALDERMASTON · BERKSHIRE
Telephone: Reading 1000 'Grams: Sterling Phone Reading Telex: 84137 Stericable Ald.

Aeroflex

LINE FUSES

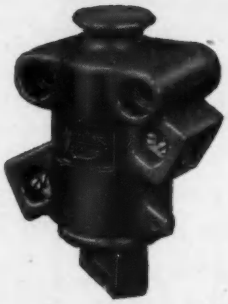
The two types of Line Fuses, differing only in connection, meet a steady demand, for instance, in the protection of pole-mounted transformers. Incorporating Aeroflex AD and FC type rewireable cartridge fuse-links, they have the characteristics necessary to provide discriminatory reaction to faults; e.g. priority can be given to consumers' fuses on house service cut-outs.

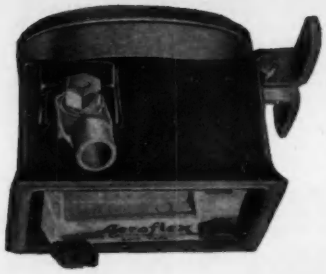
The subject is fully dealt with in our publication No. AL2.



OVERHEAD LINE FUSES

The illustration shows examples from a considerable range of overhead line fuses to suit different situations:—on the left an Aeroflex 60 amp. Rotaloc line fuse is shown, suitable for securing to the cross bar of a line support, and having an adaptable fuse handle carrying an Aeroflex high breaking capacity 60 amp. ADS type rewireable cartridge fuse-link. The right hand illustration shows a 200 amp. porcelain enclosed line fuse, embodying Link Type handle with Aeroflex Ceram high breaking capacity rewireable cartridge fuse-link.





Parmiter Hope & Sugden Ltd.

FLUVENT ELECTRICAL WORKS · LONGSIGHT · MANCHESTER 12

London: 34 Victoria Street, S.W.1. Glasgow: 5 Somerset Place, C.3. Birmingham: 39/41 Carrs Lane, 4.

dmPH142

Strength without muscles!

for their latest Fork-lift Truck Lansing Bagnall chose

G.E.C.

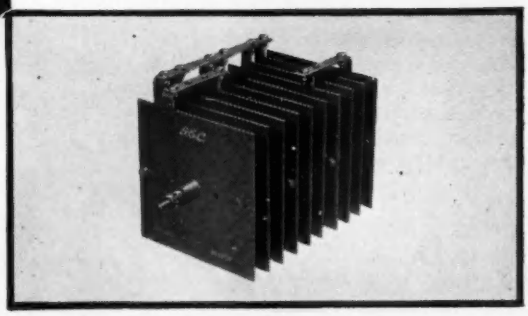
GERMANIUM RECTIFIERS

for compactness
Small size is very important in this application. The new GEX 541 rectifier stack gives maximum rectified power per unit volume.

for lightness
Germanium Rectifiers are the lightest type of rectifier available for most applications. The GEX 541 weighs only 10% of the equivalent conventional rectifier.

for efficiency
Like all germanium rectifiers in the G.E.C. range, the GEX 541 offers low forward resistance and corresponding increases in efficiency and regulation.

The BASIC GEX 541 is a germanium junction diode. Single units are available for such applications as DC blocking and gating. Complete rectifier stacks can be supplied, finned or unfinned, suitable for currents up to 160 amps. or D.C. output voltage of up to 900 volts.



For Data Sheets and further information please write to the Semi-conductor Division

THE GENERAL ELECTRIC COMPANY LIMITED
MAGNET HOUSE · KINGSWAY · LONDON W C 2

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to First Post on Monday of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

DUMFRIES COUNTY COUNCIL

Street Lighting
(Trunk Road A.76 at Kirkconnel)

TENDERS are invited for:—

(1) Supply and delivery of 34 Reinforced Concrete Lighting Columns.
(2) Supply and delivery of Electrical Equipment for erection on 34 Concrete Lighting Columns.
(3) Supply and delivery of Lanterns for erection on 34 Concrete Lighting Columns.
(4) Erection of 34 Lighting Units for 140-w. Sodium Discharge Lamps on Concrete Lighting Columns.

Conditions of contract, form of tender, specification and bill of quantities may be obtained from the undersigned on payment of a deposit of £2 2s., returnable on receipt of a bona fide tender. Sealed tenders marked "Street Lighting" should be lodged with the undersigned not later than 11 a.m. on Monday, 3rd November, 1958.

The lowest or any tender may not be accepted.

Drawings may be inspected at the office of the County Engineer, County Buildings, Dumfries, during normal office hours.

LESLIE T. CARNEGIE,
County Clerk.

County Buildings,
Dumfries.
7th October, 1958. 5130

INDIA STORE DEPARTMENT

THE Office of the Chief Engineer, Madras Port Trust, Madras, India, invite tenders for the following:—

Tender Enquiry No. 16/E.P.3/04352/58, for the supply of 1,300 yds. 3½ × 0.4 sq. inch L.T. Underground Distribution Cables of 660 volts grade for South Quay III and IV.

Specifications, drawings, etc., relative to the above can be obtained direct from the Deputy Chief Accounts Officer (Engineering), Chief Engineer's Office, Madras Port Trust, Madras, India, on payment of 15 shillings per set, which is not refundable. Tenders are to be returned direct to the Chief Engineer's Office (at "C" Warehouse), Madras Port Trust, Madras, India, so as to reach them by 3 p.m. on 10th December, 1958.

Specimen copy of the above specification can be seen at India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, under reference S.3802/58/AVH/Eng.2. 5195

COUNTY BOROUGH OF BLACKPOOL

Purchase of Electric Lamps, 1959/1960

TENDERS are invited for the supply and delivery of the Corporation's Electric Lamp requirements for the year ending 31st March, 1960.

Specification, forms of tender, etc., may be obtained from the Illuminations and Public Street Lighting Officer, Rigby Road East, Blackpool.

Completed tenders must be delivered in sealed envelopes, bearing no name or mark to indicate the sender, but marked "Tender for Electric Lamps," to the undersigned at P.O. Box 11, Town Hall, Blackpool, not later than 2.30 p.m. on Friday, 21st November, 1958.

ERNEST C. LEE,
Town Clerk. 5169

REPTON RURAL DISTRICT COUNCIL

Street Lighting: Group "A"

Ashby Road East, Bretby

APPLICATIONS to tender are invited from experienced contractors for the above contract. The work consists of the provision and erection of 39 Group "A" Stanton Concrete Columns with Colour-corrected Mercury Lamps, together with all necessary lanterns and control gear.

Plans, conditions of contract and other documents may be inspected at the office of the Engineer and Surveyor, The Poplars, Rolleston Road, Burton-on-Trent, from whom specification, bills of quantities and tender form may be obtained upon payment of £2 2s., which will be refunded upon receipt of a bona fide tender and all documents.

Tenders in plain sealed envelope endorsed "Tender, Street Lighting, Bretby," must be delivered to the undersigned not later than noon Wednesday, 26th November, 1958.

The Council do not bind themselves to accept the lowest or any tender.

F. BAILEY,
Clerk of the Council.
5217

BOROUGH OF EALING

Re-wiring and Additions to Electrical Installations at 961 Dwellings on the South Ealing Estate

TENDERS are invited from Electrical Installation Contractors approved by the N.I.C. Particulars and specifications, with forms of tender, obtainable from the Borough Surveyor, Town Hall, Ealing, London, W.5, on payment of £5, returnable on receipt of a bona fide tender.

Tenders to be delivered to the Town Clerk, Town Hall, Ealing, London, W.5, not later than 9.30 a.m. on the 30th October, 1958.

E. J. COPE-BROWN,
Town Clerk. 5089

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Orrin Project

Main and Auxiliary Cabling Installation for Orrin Power Station, Ross-shire

TENDERS are invited for the supply and erection of the above-mentioned cabling work.

Tender documents may be obtained from the Engineers, Messrs. Merz and McLellan, 72a, George Street, Edinburgh, 2, on receipt of £2 2s. deposit (returnable).

The Board do not bind themselves to accept the lowest or any tender. 5215

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Shin Project

Cabling for Cassley Power Station, Sutherland

TENDERS are invited for the supply and erection of 11-kV, 1.1-kV and 660-volt power, auxiliary and control cabling and accessories for the above power station.

Tender documents may be obtained from the Engineers, Messrs. Kennedy & Donkin, 12, Caxton Street, London, S.W.1, on receipt of £2 2s. deposit (returnable).

The Board do not bind themselves to accept the lowest or any tender. 5216

SITUATIONS VACANT

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area Headquarters, Bedford

FOURTH ASSISTANT ENGINEER,
Operation and Maintenance (109/58.R).

Duties will include assistance in the commissioning of substations up to 33 kV, pressure testing, fault location and calculation of protective gear settings.

Salary N.J.B. Class L, Grade 13 (£835-£880).

Apply by letter, within 14 days, to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend Street, Bedford.

Essex Sub-Area

THIRD ASSISTANT ENGINEERS
(a) North Essex District (110/58.R).
(b) Thurrock District (111/58.R).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations.

Salary N.J.B. Class F, Grade 9 (£790-£835) (Thurrock District, plus London allowance).

Apply by letter, within 14 days, to:—
(a) J. C. Horrell, M.I.E.E., Manager, Eastern Electricity Board, Cressing Road, Braintree, Essex.
(b) H. J. Unwin, A.M.I.E.E., Manager, Eastern Electricity Board, Maidstone Road, Grays, Essex.

Northmet Sub-Area, Wood Green District

DISTRICT COMMERCIAL ASSISTANT
(Ref. 812) (113/58.R).

Candidates must have had sound practical training with experience in electrical installation work for domestic, commercial and industrial premises and be capable of dealing with the installation of heavy switchgear, paper insulated cables, floor warming and the installation of capacitors. Proven ability to sell appliances to improve system load factor and a sound knowledge of the application of tariffs are essential.

Salary N.J.C. Grade 3 (£720-£780), plus London allowance.

Apply by letter, within 10 days, to R. A. Voit, M.I.E.E., Manager, Eastern Electricity Board, 13/27, Station Road, Wood Green, London, N.22. 5224

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable appointment:—

THIRD ASSISTANT ENGINEER,
Generation/Operation (Statistics) Section,
Chief Engineer's Department,
Head Office, Glasgow.

Candidates should have a good technical education, preferably having qualifications for admission to corporate membership of a recognised institution.

The successful candidate will be responsible for the production of generation statistics. Some experience in power station operation or system control would be an advantage.

Salary £1,055/£1,285 per annum in accordance with Class AX/DX, Grade 5 of Schedule B to the National Joint Board Agreement.

Apply, quoting reference No. E40/58, on standard form AE.6, available from the Secretary, P.O. Box 173, 351, Sauchiehall Street, Glasgow, C.2, not later than Friday, 31st October, 1958. 5204

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

APPLICATIONS are invited for the following position in the System Development Section of the Technical Department at Headquarters, Moseley, Birmingham :—

(a) THIRD ASSISTANT ENGINEER. (Vacancy No. 871MD).
N.J.B. service conditions, superannuable appointment, salary within Schedule B, Grade 6, commencing at a point commensurate with qualifications and experience within the range £895-£1,020 per annum, ultimately rising to £1,140.

(b) FOURTH ASSISTANT ENGINEER (Vacancy No. 872MD).
N.J.B. service conditions, superannuable appointment, salary within Schedule B, Grade 8, commencing at a point commensurate with qualifications and experience within the range £710-£835 per annum, ultimately rising to £935.

Applicants for (a) should possess qualifications equivalent to Graduate I.E.E. and should have had practical training either in the supply industry or with a switchgear manufacturer. They must also have held a position involving transmission system planning and should have a sound knowledge of the calculations required and the design and operation of such systems. Applicants for (b) should have had experience either in the supply industry or with a switchgear manufacturer, and a knowledge of the calculations involved in the development and operation of power systems will be an advantage. Technical qualifications up to Graduate I.E.E. standard are desirable.

Apply, quoting the respective vacancy number, on form AE6 to the Establishments Officer, 53, Wake Green Rd., Moseley, Birmingham, 13, by 6th November, 1958. 5186

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment :—

GENERAL ASSISTANT ENGINEER, BRIMSDOWN GENERATING STATION.

Salary Class K. within the range of Grades 16/14, £635 × £785 per annum plus London weighting, plus 10% shift allowance when required to work on shift.

Duties include assisting in the electrical control room and experience in the technical operation of electrical, boiler house and turbine house plant, testing, etc., in a generating station, and provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a generating station and/or technical training to the standard of Ordinary National Certificate or its equivalent will be of advantage.

Apply by 1st November, 1958, quoting Reference No. 2/9814, stating age, details of qualifications and experience to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts.

W. N. C. CLINCH,
Controller. 5187

DESIGNER-DRAUGHTSMAN

for design and development of electric wiring accessories. Good electrical training desirable and knowledge of mass production methods advantageous.

A high salary with good prospects for a senior designer with previous experience in this specialised branch of the electrical industry.

Applicants should write stating age, education, experience and salary required, and all letters will be treated in strict confidence addressed to: Ref. T.M., M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18.

5103

COUNTY BOROUGH OF WARRINGTON

Borough Engineer and Surveyor's Department

APPLICATIONS are invited for the following permanent appointment :—

ENGINEERING ASSISTANT (Lighting): Within Special Grade (£750 to £1,030 per annum).

The appointment, which is terminable by one month's notice on either side, is subject to the conditions of service of the National Joint Council for Local Authorities Administrative, Professional, Technical and Clerical Services and the provisions of the Local Government Officers' Superannuation Act, 1937, the successful candidate (if a new entrant to the Council's service) being required to pass a medical examination.

Candidates should state the qualifications they hold.

The candidate appointed will be responsible to the Borough Engineer for the control of a small gas lighting department, the supervision of electrical lighting carried out by the agency of an Electricity Board, the preparation of new lighting schemes, and other general electrical work.

Housing accommodation will be made available if required.

The canvassing of members of the Council, either directly or indirectly, will be a disqualification, and applicants must state whether to their knowledge they are related to any member of the Council, or any co-opted member of a committee, or any officer of the Council. Failure to do so will disqualify or may lead to dismissal without notice.

No printed form of application is being used. Applications stating age, details of training and experience, qualifications, present and previous appointments (in chronological order), together with copies of three recent testimonials, or the names of three referees, should be forwarded to the undersigned so as to be received not later than 12 o'clock noon on Monday, the 10th November, 1958.

J. Y. HUGHES, M.I.C.E.,
Borough Engineer and Surveyor.

Town Hall,
Warrington. 5182

ELECTRICAL ENGINEERS

ASSOCIATED ELECTRICAL INDUSTRIES HEAVY PLANT DIVISION, Manchester, require ELECTRICAL ENGINEERS for the design and development of large rotating electrical machines for hydro power stations and industrial applications (A.C. and D.C.).

The desired age range for candidates is 25-35 and they should preferably have served a recognised engineering apprenticeship. It would be an advantage to have had some experience in the design of rotating electrical plant or in a drawing office associated with this work.

The minimum qualifications for these posts is Grad. I.E.E., but men with the Higher National Certificate who shortly expect to become Graduate Members of the Institution will be considered.

Applications, stating age, qualifications and experience, and quoting reference B.12, should be sent to :—

Personnel Manager
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
Trafford Park, Manchester, 17

5206

METROPOLITAN BOROUGH OF FULHAM

Electrical Engineering Assistant

BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT. N.J.C. special scale, £750/£1,030, plus £30 per annum London weighting, commencing according to qualifications and experience. Good general experience of electrical installations required, and experience in the design and installation of street lighting essential. Membership of I.E.E., A.P.L.E. or I.E.S. an advantage.

Details from Town Clerk, Town Hall, London, S.W.6. Closing date 4th November. 5240

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance and Operation)

Reading District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Grade 11, Class J (£835-£880 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations, and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, and returned to him, quoting Z.955, in envelopes suitably endorsed, not later than 3rd November, 1958.

General Assistant Engineer

Chichester District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Grade 13, Class F (£590 × £15 to £635 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with distribution duties including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc. This appointment may involve standby duties. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him, quoting Z.956, in envelopes suitably endorsed, not later than 3rd November, 1958.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 5226

JUNIOR SHIFT CONTROL ENGINEERS

OWING to expansion within the company, JUNIOR SHIFT CONTROL ENGINEERS are required by The Steel Company of Wales Limited (Steel Division), in their Electrical Distribution Department.

The successful candidates are required for control room duties to assist in the operation of the electricity supply and distribution system for Abbey, Margam and Port Talbot Works.

Previous experience in this type of work is not necessary, but evidence should be provided of a good technical background.

Education up to Higher National Certificate or equivalent desirable.

Those wishing to apply should write giving full details of age, experience, present salary, qualifications and any further information considered relevant to :—

Superintendent, Personnel Services
THE STEEL COMPANY OF WALES LIMITED
(Steel Division)
Abbey Works, Port Talbot, Glam.

5205

MECHANICAL AND ELECTRICAL ENGINEERS

PENSIONABLE posts for men and women normally under 35 on 1st September, 1958. Applicants must normally have degree in engineering or physics (or Dip. Tech. for some posts) or have passed examinations necessary for A.M.I.Mech.E., A.M.I.E.E., A.F.R.Ae.Soc., etc. Exceptionally, evidence of high professional attainment acceptable in lieu. Practical training and experience required, but untrained graduates acceptable for some posts.

Men's starting salary from £755 (lower if under 25) to £1,085. Maximum (London) £1,250. Promotion prospects.

Write Civil Service Commission, 30, Old Burlington Street, London, W.1, for application form, quoting S851/58. Closing date 18th November, 1958. Earlier applicants may be interviewed before that date. 5171

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of I.E.E. or I.Mech.E. an advantage.

SHIFT CHARGE ENGINEER, BLACKWALL POINT POWER STATION (Vacancy No. 58/854).

Experience in operation of modern H.P. power station plant, preferably with P.F. firing, together with good character and ability to supervise staff. Salary Class F, Grade 7 = £935 plus £88 10s. shift p.a.

FOURTH ASSISTANT ENGINEER, TECHNICAL DEPARTMENT, DIVISIONAL H.Q. (Vacancy No. 58/855).

Candidates should possess qualifications leading to Corporate Membership of I.E.E. and have experience in the manufacture and testing of electrical equipment used in power stations and on the high-voltage transmission system. Candidates should also have experience in the commissioning and maintenance of such equipment, including protective gear. Salary Class AX/EX, Grade 7 = £860/£1,085 p.a.

FOURTH ASSISTANT ENGINEER, TECHNICAL DEPARTMENT, DIVISIONAL H.Q. (Vacancy No. 58/856).

Conditional upon the filling of Vacancy 58/855 a vacancy will exist for a Fourth Assistant Engineer, Grade 8, with similar qualifications. Salary Class AX/EX, Grade 8 = £750/£985 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 3rd November, 1958. 5184

THE NUCLEAR POWER PLANT COMPANY LIMITED

requires

ENGINEERS

to commission Nuclear Power Stations.

APPLICANTS should have had considerable operational experience of large conventional power stations and be of either Charge Engineer or Assistant Charge Engineer status.

The company operates a contributory pension scheme and assistance with house purchase is given to married men.

Applications stating age, qualifications and experience should be addressed to :—

The Secretary,
The Nuclear Power Plant Co. Ltd.,
Booths Hall,
Knutsford,
Cheshire.

Quote reference ER/CMS/59.

5203

JOHNSON & PHILLIPS LTD.

invite applications for the following posts :—

EXPERIENCED ENGINEERS to supervise cable and overhead line contracts, also factory installations.

JUNIOR ENGINEERS for training as outside Contracts Supervisors.

Candidates must be willing to travel. Applications giving particulars of age, training and experience to—

Employment Manager
JOHNSON & PHILLIPS LTD.
Victoria Works, Victoria Way, Charlton
London, S.E.7 5047

BOROUGH POLYTECHNIC

Borough Road, London, S.E.1

Principal: James E. Garside, M.Sc.Tech., Ph.D., F.R.I.C., F.I.M., M.Inst.F.

APPLICATIONS are invited for the following vacancies :—

DEPARTMENT OF ELECTRICAL ENGINEERING AND PHYSICS

Head of Department:
V. Pereira-Mendoza, M.Sc.Tech., M.I.E.E.

ASSISTANT LECTURER (GRADE B) IN PHYSICS.

Applicants should be graduates. Experience or an interest in techniques involving radio-isotopes would be a recommendation. Excellent research facilities available.

ASSISTANT LECTURERS (GRADE B) IN ELECTRICAL ENGINEERING.

Applicants should be graduates or Chartered Electrical Engineers. For one vacancy industrial or teaching experience in Electronics or Radio Engineering is desired; for the other, experience in Heavy Electrical Engineering or in industrial installation work is required.

Salary £650 × £25 to £1,025 p.a., plus London allowance and allowances for academic qualifications, training and industrial experience.

Further particulars and form of application obtainable from the undersigned.

FREDK. J. PACKER,
Clerk to the Governing Body.

5197

A Company of

THE EXPERT TOOL GROUP

requires

SENIOR DESIGNER-DRAUGHTSMEN

Applicants must have had experience in the design of contactors and relays allied to the

MOTOR CONTROL GEAR FIELD.

They should have received an engineering training and be in possession of H.N.C. or equivalent qualification.

The positions are permanent and salary will be paid commensurate with qualifications and experience.

Please write giving age, present salary and full details to :—

Chief Draughtsman
SHARP CONTROL GEAR LTD.
Lount Works
Ashby-de-la-Zouch, Leicestershire

5033

ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required for establishments in London area, Baldock, Portsmouth, Portland, Poole, Greenock and Rosyth. Main requirements are about 25 vacancies for PHYSICISTS, ELECTRONIC ENGINEERS and MATHEMATICIANS in areas specified.

The following particular vacancies also exist: MECHANICAL ENGINEER for work on gas turbine problems in the London area. MECHANICAL ENGINEER for work on design and development of U/W devices in Portland area. METALLURGISTS for Rosyth and Poole. CHEMISTS (Physical and Inorganic) for Poole area, Baldock and London.

Candidates must normally be natural-born British subjects of natural-born British parents, with at least First or Second Class Honours degrees or equivalent high professional attainments. S.S.O.s must have had at least three years' postgraduate experience and be not less than 26 years of age.

Salaries (men): S.S.O. £1,190 - £1,410; S.O. £635-£1,110 (London); somewhat lower in Provinces. Appointments unestablished (with F.S.S.U. benefits), but opportunities may occur for those between ages of 21 and 32 to compete for established posts.

Forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A98/8A. 5164

FEDERATION OF RHODESIA AND NYASALAND

Vacancy: Assistant Electrical Engineer (P.O.), Federal Public Works Department

APPLICANTS must hold Associate Membership of the Institution of Electrical Engineers, London, or a Degree in Electrical Engineering after at least a three-year course, acceptable to the Institution of Electrical Engineers, London, for exemption from their Graduate Examination. In the latter case, a minimum of four years' post-qualification experience is also required.

Duties will, in the main, consist in the preparation of designs and specifications of electrical installations in all classes of Government buildings, and site reticulation in the larger institutional sites.

The appointment will be on contract for a period of three years at a salary of : —

1st Year : £1,550 p.a.
2nd Year : £1,600 p.a.
3rd Year : £1,650 p.a.

Application forms and further details from the Secretary (R), Rhodesia House, 429, Strand, London, W.C.2. Closing date 15th November. 5199

JOSEPH LUCAS (ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

SOUTH OF SCOTLAND ELECTRICITY BOARD

Kilmarnock Generating Station

APPLICATIONS are invited for two superannuable posts as CHARGE ENGINEERS at the above station.

Applicants should have had experience in a modern generating station and, preferably, possess a Higher National Certificate in Electrical or Mechanical Engineering.

Salary N.J.B. Class F, Grade 7, £885/£930 per annum, plus shift allowance of 10% per annum.

Forms of application may be obtained from the Secretary, South of Scotland Electricity Board, 168, Broomhill Drive, Glasgow, W.1, and returned not later than 5th November, 1958. 5227

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT MAINTENANCE ENGINEER (Electrical) is required at Hams Hall "A" Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade J.8, £995-£1,055 per annum.

Applicants should have received a sound technical training and practical experience in electrical maintenance in a modern power station, and the possession of an appropriate technical qualification will be an advantage.

Apply, quoting Vacancy No. 876MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 10th November, 1958. 5218

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Project Group

Belvedere Power Station, Construction Side

APPLICATIONS are invited from suitably qualified and experienced engineers for the following appointments:—

1. SENIOR ASSISTANT ENGINEERS (Mechanical). To assist the resident site engineer during the construction of the station, in the supervision of the erection and commissioning of the mechanical plant and equipment. The units are of 60 MW and 120 MW capacity, the latter designed for reheat.
2. SENIOR ASSISTANT ENGINEER (Electrical). For similar duties in the supervision of the installation and commissioning of the electrical plant, switchgear control equipment and cabling.

Salaries for these positions will be in accordance with the National Joint Board Agreement, Schedule C, Grade 3, £1,385 to £1,735 per annum, plus London allowance.

Applications stating age, qualifications, experience, present position and salary, indicating the post for which application is made should be forwarded to the Administration Officer, Squires Lane, Finchley, London, N.3, to arrive not later than the 31st October. Envelopes should be marked, "Confidential, ref. S/58/16." 5241

NORTH EASTERN ELECTRICITY BOARD

York Sub-Area

APPLICATIONS are invited for the appointment of SENIOR DEMONSTRATOR or DEMONSTRATOR at York Service Centre.

Applicants for the post of Senior Demonstrator should have the E.A.W. Diploma or equivalent qualification and considerable experience as a Demonstrator. Salary Grade 2, £615/£675, according to qualifications and experience.

Applicants for the post of Demonstrator should have a certificate of a recognised domestic science training college and/or E.A.W. Certificate, preferably the latter; also experience as a demonstrator or assistant demonstrator in electricity supply industry. Salary Grade 1, £500/£600. Annual increments of £20 up to £540, beyond £540 increments subject to certificate of competence.

Applications stating age, qualifications and experience to be received by the Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 5200

MIDDLESEX COUNTY COUNCIL

Architect's Department

ELECTRICAL ENGINEERING ASSISTANT, A.P.T. II (£725-£845 p.a.) for preparation of plans and specification for wiring of buildings. Established and pensionable.

Junior post, similar duties to above, A.P.T. I (£575-£725 p.a.). Unestablished for 2 years in first instance. Salaries according to qualifications and experience, plus £30 London weighting if 26 or over.

Prescribed conditions.

Application forms (s.a.e., f'scap) from County Architect, 1, Queen Anne's Gate Buildings, Dartmouth Street, London, S.W.1, returnable by 12th November. Canvassing disqualifies. 5196

LONDON COUNTY COUNCIL

South East London Technical College

LECTURER IN ELECTRICAL ENGINEERING. Should possess a degree, have had suitable industrial experience and ability to teach up to I.E.E. Part III standard. The College offers full-time diploma, sandwich courses, part-time day and evening courses in electrical engineering. Facilities for research are available.

Burnham Scale for Lecturers is £1,200 × £30 to £1,350 plus increments for experience, and London allowance of £36 or £48.

Application forms from the Secretary, Lewisham Way, London, S.E.4, to be returned by 7th November, 1958. (1965) 5165

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

APPLICATIONS are invited for the following positions:—

(a) SHIFT CHARGE ENGINEER at Walsall and Birchills Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade J.7, £1,065-£1,140 per annum, plus 10% shift allowance. (Vacancy No. 873MD.)

(2) SHIFT CHARGE ENGINEER at Stoke Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade E.7, £835 - £880 per annum, plus 10% shift allowance. (Vacancy No. 874MD.)

Applicants for (a) and (b) should have a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear. Appropriate qualifications desirable.

Apply, quoting the respective vacancy number, on form AE6 to the Establishments Officer, 53, Wake Green Rd., Moseley, Birmingham, 13, by 6th November, 1958. 5185

JOSEPH LUCAS (ELECTRICAL) LIMITED

ASSISTANT ELECTRICAL DESIGN ENGINEER

required for the design of rotating electrical machines and electro-magnetic devices. Projects will include fundamental design investigations, and full scope will be given for initiative and imagination.

The post is permanent and pensionable.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/221.

125

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Dundee Area

Assistant Shift Charge Engineer

APPLICATIONS are invited from suitably qualified engineers for the above post. Applicants should have a sound practical and technical training, with experience of large turbo-alternators and switching operations on 33 and 132-kV system associated with a generating station.

Salary N.J.B. Scale, Class F, Grade 9 (£790 × £15 to £835 per annum).

Application forms, obtainable from the undersigned, should be submitted by 10th November, 1958.

R. B. ANDERSON, M.I.E.E.,
Area Manager.

7, Dudhope Crescent Road,
Dundee.
17th October, 1958. 5228

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

INSTALLATION INSPECTION ENGINEER required in the Warrington District. Salary within range £835/£880 per annum (N.J.B. G/9).

Previous experience in installation work essential. Appropriate technical qualifications desirable.

Duties include the supervision of installation inspectors and meter fixers.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from Manager, No. 2 Sub-Area, Sandiway House, Northwich, Cheshire. Closing date 31st October, 1958. 5201

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Vacancy No. 111/ER/58

APPLICATIONS invited for the superannuable N.J.B. post of THIRD or FOURTH ASSISTANT ENGINEER in the System Design Section, Technical Department.

Salary AX/DX6/5, £895-£1,285 or AX/DX8/7, £710-£1,010 according to experience and qualifications.

The section is concerned with the investigation of schemes for the extension of the 132 kV and 275 kV system in South Wales and has to deal with a wide variety of power system problems including load flow studies, fault investigations and the analysis of system behaviour. The section has at its disposal a D.C. calculating board and an A.C. network analyser is under construction.

Candidates should have a University Degree or Higher National Certificate, and some practical experience in the supply or manufacturing industries would be an advantage.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 3rd November, 1958. 5220

COUNTY BOROUGH OF GRIMSBY

Education Committee

COLLEGE OF FURTHER EDUCATION
Principal: E. S. Green, B.Sc., A.R.I.C.

APPLICATIONS are invited for the post of ASSISTANT GRADE B to teach Electrical or Mechanical Engineering. Applicants should possess a Higher National Certificate or degree qualification and suitable teaching or industrial experience is desirable.

Salary in accordance with the Burnham Scale for Teachers in Technical Institutions (£650 × £25 to £1,025 with certain additions for degree and training where appropriate). Increments on the scale will be granted for approved industrial experience.

Further information and application forms may be obtained from the undersigned, and applications should be returned within fourteen days of the appearance of this advertisement (s.a.e).

R. E. RICHARDSON,
Director of Education.

Education Office,
Eleanor Street, Grimsby.
13th October, 1958. 5198

INTERNATIONAL SYNTHETIC RUBBER CO. LTD.

Maintenance Electricians

SECURE employment is offered in a new factory to persons available for day or shift work. Applications from persons who have had experience in the chemical industry especially welcome.

Generous sickness payment and superannuation schemes. Subsistence payable until houses become available in approximately nine months' time.

This is a unique opportunity to settle your home in the lovely New Forest area.

Applications giving full particulars of age, experience, etc., should be addressed to the Labour Officer of the Company at Hythe, Hampshire. 5229

SOUTH AFRICA SWITCHGEAR CONTRACT ENGINEERS

JOHNSON & PHILLIPS Limited invite applications from experienced switchgear engineers for a number of inside appointments which they wish to make to the staff of their South African Factory near Johannesburg.

The duties will involve the complete preparation and handling of tenders and contracts covering switchgear projects up to 66 kV.

The conditions of employment are attractive and there are ample opportunities for advancement.

Suitably competent engineers within the age limits 28-38 should send full details of their qualifications and previous experience to the

General Manager, Overseas
JOHNSON & PHILLIPS LTD.
Charlton, London, S.E.7 5230

LONDON ELECTRICITY BOARD

Engineering Draughtsman

APPLICATIONS are invited for the above position in the Board's North Western District at Hampstead, London, N.W.3.

Candidates should have a good general and technical education up to Ordinary National Certificate standard, be neat and capable draughtsmen, and be experienced in one or more of the following subjects: drawing office routine, electrical diagrams, layout of plant in transformer chambers, elementary building construction, mains survey and work in mains records office dealing with systems of all voltages up to 11 kV.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 6, £635 to £755 per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 31st October, 1958. Please quote ref. PER/2555/R. 5202

ELECTRICAL FOREMEN

OWING to expansion within the company a DAY ELECTRICAL FOREMAN and an ASSISTANT ELECTRICAL FOREMAN are required by The Steel Company of Wales Ltd. (Steel Division), in their Coke Ovens Department.

Applicants should be active and able to direct and supervise electrical maintenance work.

Ordinary National Certificate is desirable, but good practical experience is essential.

Candidates wishing to apply should write giving full details of age, experience, present salary and any information considered relevant to :—

Superintendent, Personnel Services
THE STEEL COMPANY OF WALES LTD.
(Steel Division)
Abbey Works, Port Talbot, Glam

5173

INDUSTRIAL TRANSFORMERS DESIGN ENGINEER

APPLICATIONS are invited by one of the leading companies in the electrical industry for a senior appointment to the position of DESIGN ENGINEER, INDUSTRIAL TRANSFORMERS.

Extensive experience is required in the design, production and testing of industrial transformers up to 1,000 kVA, together with the ability and enthusiasm to lead a technical team responsible for the progressive extension of the company's activities in this field.

It is anticipated that a substantial salary will be paid to the engineer with the necessary ability, and the appointment will be eligible, after a qualifying period, for the company's superannuation and pension schemes. Residence is expected in due course in the central Midlands area.

Applicants are requested to write in confidence, giving details of age, qualifications, present salary and record of experience, to the Managing Director.—Box 5031.

EASTERN ELECTRICITY BOARD

Essex Sub-Area

FITTER (Electrical), Thurrock District (112/58.N). General experience of electrical fitting work is necessary with particular reference to substation construction, the erection of high and low voltage switchgear and the installation of transformers.

Remuneration and conditions of employment will be in accordance with N.J.I.C. Agreement for the Electricity Supply Industry. The present rate is 4s. 11½d. per hour, for a 44-hour week, plus 8s. 3d. per week, productivity allowance.

Apply by letter, within 14 days, to H. J. Unwin, A.M.I.E.E., Manager Thurrock District, Eastern Electricity Board, Maidstone Road, Grays, Essex. 5223

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division
Vacancy No. 113/ER/58

APPLICATIONS are invited for the superannuable N.J.B. appointment of FOURTH ASSISTANT ENGINEER in the USK-MOUTH and CARDIFF TRANSMISSION SECTIONS.

Salary AX/DX 7 or 8, £710 - £1,010 per annum, according to qualifications and experience.

Electrical Engineering Degree or H.N.C.

Candidates should have served an engineering apprenticeship. Experience in the maintenance of high-voltage equipment would be an added advantage.

The successful applicants will be employed on the maintenance and repair of 275-kV and 132-kV equipment.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 5th November, 1958. 5219

MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEERS (two) required in the Evesham District of the Worcester and District Sub-Area for duties in the Planning and Operation and Maintenance Sections respectively. The Evesham District is mainly rural in character and the greater part of the distribution is carried out by overhead mains.

Applicants should have had a sound technical training and experience in all branches of distribution work. Technical qualifications desirable.

Salary £790/£835 per annum (N.J.B. Grade F.9). Superannuable.

Apply by letter, within 14 days, stating age, experience, technical qualifications, present salary and position to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS,
Secretary.
5222

YORKSHIRE ELECTRICITY BOARD

No. 4 (Leeds) Sub-Area

ASSISTANT CONSUMERS' ENGINEER. Applicants should have had a sound practical training in the electricity supply industry and should preferably have qualifications leading to membership of the Institution of Electrical Engineers.

They should have had experience in general load development in the industrial, commercial and domestic fields, be fully conversant with Electricity Supply and I.E.E. Regulations, and be capable of undertaking all forms of consumer service.

Salary N.J.B. Class K, Grade 10, £935/£20/£995 per annum.

Applications, quoting 4 SAR, and giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Nr. Leeds, not later than 7th November, 1958. 5225

LONDON ELECTRICITY BOARD

Demonstrator (Female)

APPLICATIONS are invited for the above position in the East End District. Applicants should be suitably qualified, holding the E.A.W. or other approved certificate including electrical housecraft, and having experience in conducting demonstrations at service centres and general service centre duties. They should also be experienced in advising consumers on the selection and use of domestic appliances, both at the service centre and on consumers' premises.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 1, i.e., £525 to £625 per annum, plus the appropriate London Area allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned completed by 31st October, 1958. Please quote ref. PER/2534/R. 5170

MINISTRY OF SUPPLY

TECHNICIANS required at Farnborough, Hants, Chessington, Surrey, or Malvern, Worcs., to prepare technical publications on the theoretical and practical aspects (general principles, operation, maintenance and repair) of air-borne and ground equipment for radio (including radar) control search and navigation.

Qualifications: British of British parents. Should have served recognised engineering apprenticeship or have had equivalent training in electronic engineering. Must have sound theoretical know.edge of radio and good practical experience in this field in a position of technical responsibility. Some experience in writing or editing technical publications or of instructing in technical subjects would be an advantage. Possession of O.N.C., appropriate City and Guilds Final Certificates or equivalent qualification is desirable.

Rate of pay: Chessington £870 (age 30) to £1,030 p.a.; Farnborough or Malvern £820 (age 30) to £974 p.a.

Application forms from M.O.L.N.S., Ref. PE.1945, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. 5172

SIMPLEX ELECTRIC COMPANY LTD.

have vacancies for Technical Staff at

THE CREDA DESIGN CENTRE

in London (adjacent Alperton Underground Station).

Present requirements are for :

PROJECT ENGINEERS: Graduates with ability to foster the development of a product through all stages and with experience of domestic appliances, motorised or otherwise.

DESIGNERS, with experience of domestic appliances and sound knowledge of design for modern production methods.

TECHNICAL ASSISTANT, familiar with engineering laboratory techniques and a real interest in development work.

Written applications with full details of industrial experience and salary expected will be received in strict confidence by the Secretary, Simplex Electric Co. Ltd., Oldbury, Birmingham. 5166

SOUTH WALES ELECTRICITY BOARD

A VACANCY exists for a DEMONSTRATOR in the Merthyr Tydfil District of the Cardiff and East Central Area of the Board.

The principal duties include demonstrating cooking and other appliances, either in public or at consumers' premises and providing assistance in service centres.

The salary for this post will be Grade 1 (£500/£600) of the National Joint Council for the Electricity Supply Industry.

Essential qualifications required are the diploma of a recognised domestic science training college, Demonstrator's Certificate, the E.A.W. Certificate or equivalent qualifications, with experience of electrical appliances.

Applications stating age, qualifications, experience and particulars of present duties should be addressed to the Secretary (Establishments), St. Mellons, Cardiff, so as to reach him not later than Tuesday, the 4th November, 1958.

Secretary's Office,
St. Mellons.
13th October, 1958. 5183

ASSEMBLY departmental manager required by S.W. London company manufacturing electricity meters of all types. Applicants must have had similar experience, controlling approx. 250 employees, responsible to works manager. Must be conversant with modern methods, time study and possess a background relating to accurate electro-mechanical instrument assembly and be able to ensure quality results against scheduled requirements. The appointment carries an attractive salary with a contributory pension scheme, good conditions, full encouragement by top management to the person selected showing initiative and obtaining the desired results. Age 35/45. Write with full particulars of experience.—Box 3, Smith Meters Ltd., Rowan Road, Streatham Vale, London, S.W.16. 5124

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division
S/13.1033

GRADE 12 ENGINEERS, MARCHWOOD GENERATING STATION. Those appointed may be required to undertake shift operational duties, to assist on maintenance work, or to perform general station duties. Previous experience of modern generating station plant is desirable.

Applicants should have had a sound technical training and should possess qualifications leading to Corporate Membership of an appropriate professional institution or hold equivalent qualifications.

Salary N.J.B. K/12, £835-£880.

Special application forms, obtainable only from P. D. A. Oliver, Divisional Secretary, Central Electricity House, High Street, Portsmouth, should be returned by 5th November, 1958. 5221

A.M.I.E.E., Graduate I.E.E. or holder of City and Guilds Electrical Engineering Practice Final Certificate to teach in Normal Technical College, P.O. Box 356, Koforidua, Ghana. 9511

ARON ELECTRICITY METER invite applications for the position of indoor sales engineer. Applicants are required to have a sound technical background, preferably applied to electricity meters and electronic equipment. Superannuation scheme in operation. Applicants should supply full details of experience, age, and salary required, and replies, which will be treated in the strictest confidence, should be marked "Personal" to the General Sales Manager, Aron Electricity Meter Limited, 72-82, Salusbury Road, London, N.W.6. 5161

ASSISTANT electrical engineer/draughtsman, 23/27, with at least O.N.C. qualifications, experienced in estimating and contract work for mechanical handling plant. Practical experience of control system desirable. Pension fund. Sports and canteen. Particulars of experience, qualifications and salary required to—W. J. Jenkins & Co., Retford, Notts. 5094

ASSISTANT required for commercial department of old-established manufacturers of electric light fittings. Duties will include invoice pricing and customers' telephoned enquiries. Excellent opportunity for young man 21-25 with preferably some knowledge of the industry. Write full details to—Box 5125.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., 24, Fennel Street, Manchester, 4. Electrical surveyor required for district in Great Britain. Permanent position carrying progressive salary scale £735 to £1,060 and non-contributory pension. Candidates, age 26 to 32, preferably with H.N.C. in Electrical Engineering or Grad. I.E.E., and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply in own handwriting, stating age, qualifications and experience. 5207

CABLE manufacturer (independent) requires representative for Home Counties, preferably experienced in thermoplastic cables and with connections throughout electrical industry. —Box 5208.

COUNTER assistant required for wholesale electrical department. Experience essential. Apply with reference to—Messrs. Wm. Dibben & Sons Limited, 62, Commercial Road, Southampton. 5209

DESIGNER required for development work on low-voltage air circuit breakers. Housing accommodation available to suitable applicant. Applications giving age, experience, qualifications, etc., to the Personnel Manager, which will be treated in strict confidence, to—Box 5188.

ELECTRIC cable manufacturers (rubber and thermoplastic) in London area have exceptional opportunities for 2 young men, one production and one commercial, of good education and practical training to work with industrial management consultants in reorganisation plans. Appointments are permanent and pensionable and hold prospects of promotion to senior positions, including board. Apply — Independent Consultants Ltd., 22, Stafford Road, Eccles, Manchester. 5189

ELECTRICIANS and chargehands required for industrial contracts. Vacancies for experienced men for work in Home Counties and other areas. Applications giving full details to—Box 5150.

ELECTRICAL engineer required with design experience of electro magnets, solenoids, lifting magnets, etc., age 30-45, by old-established firm Manchester area. Good opportunity for suitable man, pension scheme and assistance with housing. Please give full particulars of experience, qualifications and present salary or salary expected to—Box 5210.

ELECTRICAL engineers. Opportunities exist in our power cable research and development dept. for asst. electrical engineers. Work associated chiefly with design, construction and testing of high voltage cables. H.N.C. or equivalent desirable. Pension scheme, canteen and sports facilities. Write with full details to—Siemens Edison Swan Ltd., Ref. 744/32, Woolwich, London, S.E.18. 5075

FOSTER TRANSFORMERS Ltd., South Wimbledon, London, S.W.19, have vacancies for testers for work on all types of transformers up to 3,000 kVA. Applicants should have had some training or experience in the electrical industry. Apply in first instance giving details of experience and salary required to the Personnel Officer. 5174

HAIRDRESSERS' wholesale house have vacancy for a competent man in department dealing with hairdressing electrical equipment. 5-day week; permanent progressive situation. Apply — Nageles, 8/12, Broadwick Street, London, W.1. 5175

JOINTER required by London Electricity Board in Southern District. N.J.I.C. rates of pay and conditions of service, 4s. 9½d. per hour (plus productivity allowance of 8s. 3d. per week payable after one month's service in the electricity supply industry). A suitably experienced applicant may be appointed as jointer (E.H.T.), 4s. 11½d. per hour. Application forms obtainable from Personnel Officer, 46, New Broad St., London, E.C.2, to be returned completed by 31st October, 1958. Please quote ref. PER/6794/R. 5231

JUNIOR engineer required by The Rheostatic Company Limited, of Slough. The applicant should possess the H.N.C. in Mechanical or Electrical Engineering with appropriate endorsements, and have some training and experience in the design or engineering of small electro-mechanical devices. Apply giving full details of training, experience and qualifications to the Personnel Manager. 5176

LABORATORY technician reqd. at L.C.C. Paddington Technical College, Saltram Crescent, London, W.9, for electrical laboratories. Salary £335 at 20 rising to £490. Addl. increments for specified quals. to £577. Partics. and applicn. forms (rtnble. within 14 days) from Secretary. (2032) 5190

LIGHTING representative required by G. A. Nicholas Ltd. at their Morley branch to cover Yorkshire area. Salary by arrangement. Car provided. Replies to—Managing Director, 28/30, Bridge Street, Manchester, 3. 5232

LONDON E.W.F. wholesaler requires immediately young man in pricing office. Only those with previous experience should apply. Give full particulars in confidence to—Box 5191.

MAJOR petroleum distribution company require for their London office a fully experienced electrical engineer for the development of new projects and the maintenance of existing electrical installations. Applicants preferably should have experience in flameproof construction, be familiar with codes of practice relative thereto, and be well versed in the technical supervision of contracted works. Starting salary commensurate with qualifications and experience. Excellent pension scheme. Apply giving full details of age, qualifications and experience to Box 5077. Replies can only be sent to those selected for interview.

MANAGER for stores department of electrical wholesalers 20 miles N.W. of London. Successful applicant, who should have some knowledge of electrical wholesale trade, would control all sections of stores, including purchasing, stock control, trade counters, receipt and despatch. Apply in writing—Russell's Supplies Ltd., Loates Lane, Watford. 5192

OVERHEAD foremen and linesmen wanted for pole work up to 33 kV. Good hours, permanent position, London rate for right people.—Box 5177.

OVERSEAS erection engineers required to supervise the erection and commissioning of 33 kV and lower voltage switchgear, associated control schemes and ancillary equipment in various parts of the world. Applicants, preferably single, should write giving full details of age, experience, etc., to the General Manager, South Wales Switchgear Ltd., Blackwood, Monmouthshire. 5233

REPRESENTATIVE required, progressive electrical wholesaler. Experience and existing connection with contractors and industrial users essential. Salary, commission and expenses. Car provided. Write details—Finch Wholesale Electrics Ltd., 550, Ley Street, Ilford, Essex. 5234

REQUIRED for trade association, assistant aged 25-35 with engineering background, preferably in the electrical manufacturing industry. Ability to work independently necessary. State technical experience and salary required. —Box 5235.

RESIDENT engineer required by the University College of Swansea to supervise and control a number of mechanical and electrical engineering sub-contracts in connection with building development at the University. Candidates must be not less than 35 years of age and possess technical qualifications up to National Certificate standard, mechanical and/or electrical, or be Graduate or Associate Members of the Institution of Electrical Engineers or the I.H.V.E. Preference will be given to applicants who have had some design experience either in heating and ventilation or in electrical installation work and who have had previous experience in supervision on sites of engineering works. The inclusive salary will be £1,000/£1,250 per annum, according to experience. Applications in writing should be made to the Architects, Sir Percy Thomas and Son, 10, Cathedral Road, Cardiff, giving full particulars of age, qualifications and experience. Closing date for applications 10th November, 1958. 5167

SALES assistant required for electrical showrooms. Knowledge of domestic appliances, lighting fittings, etc., essential. Company near Liverpool St. Station, London. State age and experience.—Box 5236.

SENIOR contracts engineer required for expanding organisation in West Country, with experience of battery charging and rectifier applications. Must be capable of handling complete schemes and estimates with customers. Excellent prospects for applicant with required experience and qualifications. Write in confidence to—Box 5080.

SENIOR design development engineer required by well-known manufacturer of rotating electrical machines. A vacancy with opportunity for a man with ability and experience in design of medium-sized induction motors. Submit experience, salary, age, etc.—Box 394.

SENIOR design draughtsman for design and development H.V. switchgear, transmission and substation equipment. O.N.C. min., H.N.C. desirable. Pension scheme, 5-day week. Salary commensurate with experience and qualifications. Write stating age and experience to the General Manager, Electric Transmission Ltd., Newstead, Trentham, Stoke-on-Trent. 5097

SENIOR transformer designer required with design experience of transformers up to 10 MVA at 33 kV. Permanent and progressive position with attractive pension scheme. Write giving details of experience and salary required to—Woden Transformer Co. Ltd., Moxley Rd., Bilston, Staffs. 5153

SERVICE engineer required for company manufacturing full range of electricity meter products. Experience of electricity meters desirable but not essential. Applicants must have sound technical background and be prepared to travel throughout the British Isles. This position offers first-class opportunities for further advancement. Applicants should supply full details of experience, age and salary required. Car supplied and superannuation scheme. Replies, which will be treated in the strictest confidence, should be marked "Personal" to the General Sales Manager, Aron Electricity Meter Limited, 72-82, Salusbury Road, London, N.W.6. 5160

SOUTH EAST LONDON TECHNICAL COLLEGE, Lewisham Way, London, S.E.4. Grade A Assistant for electrical engineering and/or allied subjects. Candidates should possess H.N.C., degree or other quals. and have suitable industrial expce.; ability to teach engineering drawing an asset. Burnham F.E. salary, £475 × £25 to £900 with additions for training and quals. and £36 or £48 London allowance; increments within scale for expce. Application forms from Secretary, to be returned by 7th Nov. (2036) 5178

SWITCHGEAR engineer required as sales representative in the Caribbean, preferably unmarried. Excellent opportunities for suitable applicant. Apply giving full details of age and experience, etc., to the General Manager, South Wales Switchgear Ltd., Blackwood, Mon. 5154

STOREKEEPER. Must be thoroughly experienced and only those who have worked for an electrical wholesale company for many years need apply. Applications by letter only stating full details.—Halsey's Electric Co. Ltd., Brandon House, Wyfold Road, Fulham, London, S.W.6. 5179

TECHNICAL area manager required for London office of A.C. motor control manufacturers. Write in first instance to Managing Director, Klockner-Moeller England Ltd., 7, Charterhouse Buildings, London, E.C.1. 5237

TECHNICAL sales representative. Experience of medium/light engineering and low-voltage switchgear and allied fields and in dealing with industrial users, consultants, wholesalers, etc., desirable. Salaried appointment. Small works Outer London area. Full details to—Box 5085.

TEMPORARY editorial assistant required by the Institution of Electrical Engineers for a period of about three months (full-time), commencing on 1st January next, for the editing of MSS. for publication in the Proceedings. Familiarity with the subject of electrical engineering and a knowledge of British standard definitions, symbols and abbreviations is essential, together with the ability to edit to the high standard of this publication. A member of the Institution who has recently retired would be particularly suitable. Those interested are asked to communicate with the Secretary, at Savoy Place, London, W.C.2, as soon as possible. 5238

TRACER required for electrical accessory manufacturers. Must be a neat worker and capable of small intricate drawings. Good timekeeping is essential. Written applications in the first instance to—T. M., M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18. 5013

TRADE counter assistant required. Write stating experience and salary expected to—Bill Switchgear Ltd., 38, Gillingham Street, London, S.W.1. 9499

X-RAY service engineers required for London and the Home Counties. Must be experienced in the installation and maintenance of medical X-ray equipment. Apply in writing giving full details of training, experience and present salary to A. E. Dean & Co. (X-Ray Apparatus) Ltd., Progress Way, Croydon, Surrey. 5193

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ELECTRICAL contracts engineer, estimating and supervision, also specialist in industrial and domestic floor heating (not manufacturers) desires change.—Harrison, REGent 6351. 9502

ENGINEERING sales manager, A.M.I.E.E. (34), single, seeks further executive appointment in Singapore, Malaya, Indonesia or Hong Kong. Comprehensive engineering/commercial experience in wide range of electrical and mechanical plant, etc. First-class references. Available early January, 1959.—Box 9513.

GRADUATE Member of the Incorporated Sales Managers' Association at present employed as a snr. representative with a leading manufacturer of electrical accessories is seeking a post as assistant sales manager or similar. Age 35. Good technical knowledge. Many years' successful selling experience in the electrical trade.—Box 9504.

KEEN, conscientious man (41), resident S. London, O.N.C. (Elect.), administration and sales experience with manufacturers, seeks genuine permanent position to prove his ability to earn salary £1,000 per annum.—Box 9503.

MANUFACTURERS' representative, Tyneside area, desires change. Connection with wholesale, retail, industrial, N.C.B. and Area Boards.—Box 9497.

ARTICLES FOR SALE

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., s/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

ELECTRICAL EQUIPMENT FOR SALE

BATTERY of 6 HARLAND HI-VE Switchgear, type 3, 11 kV, 400 amps., 3-phase, 50 cycles.
2 BRUCE PEEBLES 100-kVA Transformers, 10,750/400 v.
1 BRUCE PEEBLES Rectifier Transformer, 1,075/400 v.
1 BRUCE PEEBLES Rectifier, 50 kW, 480/240 v. D.C.
1 BRUCE PEEBLES Spare Cooling Fan, 240 volts D.C.
1 E.E.C. Spare Valve.

Can be seen in operation by arrangement with Mr. J. Weed, H.C.B.S. Ltd., 43, Union Street, Hamilton. 5212

HOUSE SERVICE METERS

200 200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI.5105. 67, Rothschild Rd., London W.4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675 kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-588 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24-110 and 220 v. D.C. to 230/1/50 A.C., 300 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC lamps and bulbs of all kinds from 1.5 v. to 250 v., lowest prices, lists on request.—Suplex Lamps Ltd., 239, High Holborn, London, W.C.1. (Hol. 0225). 5156

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

EQUIPMENT for sale: Fuller Ward Leonard set, input 90 h.p., 400/3/50, output 0/460 volts, 150 amps., Ellison starting gear; Crom.-Park. slipring motor, 90 h.p., 400/3/50, 1,400 r.p.m., b.b., Ellison starting gear; Brush D.C. generator, 460 volts, 55 kW, 1,400 r.p.m., b.b. Cheap for quick sale.—A. C. Dibley & Co. Ltd., 72, Granville Road, London, N.W.2 (Tel. Meadway 2251). 5168

FLAMEPROOF fluorescent fittings, 5 ft., 80 watts, by Revo, Cat. No. C.11474, as new. Large quantity available at less than half list price. Further details from — Leighton Warehouse Co. Ltd., 6, Church Road, Linslade, Leighton Buzzard (Tel. No. L.B. 3400). 9512

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues.— The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FOR sale, motor generator, rotary converter and Ward Leonard sets in a great range of outputs, speeds and control systems.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 161

FRACTIONAL h.p. motors, new, ex stock, A.C./D.C., Universal, B.T.H., Delco-Remy, G.E.C., Fracmo, Newman, Scophony. — Jeary Electrical Co. Ltd., 5, Lamb's Buildings, London, E.C.1. 126

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc. — Powerco Ltd., 312, York Rd., London S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW, A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

LANCASHIRE Dynamo & Crypto alternator, 48 kVA, p.f. .8, 3-phase, 50 cycles, 400 v., 600 r.p.m., complete with exciter. Mftd. 1932.—Smith Brothers (Leicester) Ltd., Batten St., Aylestone Road, Leicester. 5213

LINDLEY-Thompson 750-kVA outdoor type oil-immersed, 3/3-phase, 50-cycle transformer. Primary 11,000 volts. Secondary 440 volts. Vector Group Reference 41Dy11.—Whitefield Machinery & Plant Limited, Cobden Street, Salford, 6 (Tel. PEN. 4746). 5054

LISTER 3-cylinder diesel generator, 15 kVA, 230 volts, 50 cycles, single-phase, complete with switchboard and automatic voltage regulator on R.S.J. bedplate.—Box 9514.

MERCURY arc rectifier, 11,000 v., 3-ph., 50 c. A.C. input, 110 kW, 220 v. D.C. output.—Yarrow & Co. Ltd., Scotstoun, Glasgow, W.4. 5194

MOTORS and control gear, huge stocks all types, ¼ to 200 h.p.—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (3774/5/6). 70

Articles for Sale (continued)

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

ONE (new 1940) indoor transformer by E.C.C., 1,500-kVA capacity, 11 kV to 400/3/50 cycles, 4-wire. Immediately available.—Box 5100

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

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POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

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1,000-kVA B.E.T. transformer, 6,600 volts primary, 400 volts secondary. —Curran Steels Ltd., Cardiff (Tel. 22257, Ext. 13). 5180

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COMPANY MEETINGS

PHŒNIX TELEPHONE AND ELECTRIC HOLDINGS

Policy of Diversification

THE 8th Annual General Meeting of Phœnix Telephone and Electric Holdings Limited was held on 17th October in London, Mr. G. F. Shipman (the Chairman) presiding.

The following is an extract from his circulated statement:—

The net profits for the financial year ended 28th February, 1958, amount to £87,895 as against £130,110. This result represents the first check since your company was incorporated. However, I would remind you that the preceding year was by far the most successful in the history of the business. Your Directors recommend for the year a dividend of 20% (less income tax) on your company's Ordinary Shares.

The year's results are in line with the note of caution, as regards prospects, which I felt necessary to introduce in my last statement. A substantial proportion of the Group's output is supplied to the Post Office, from which it follows that the Group was adversely affected by the policy of reducing orders and spreading out deliveries which was adopted by the Post Office in connection with the "credit squeeze," which also had repercussions, although to less extent, on the domestic appliances side of the Group's business. Another factor was the increases in Post Office telephone charges.

As regards the current financial year, the same adverse factors have continued to make themselves felt and are bound to have an effect on the results. However, in the changed economic climate which is developing it seems reasonable to hope that, in the absence of further disturbing developments in the international situation, an improving tendency will gradually develop.

As to future policy, your Directors consider that it would be advantageous, and would strengthen the Group, if a greater measure of diversification could be achieved, and they are seeking to put that policy into effect.

The current year represents a landmark in the history of the business inasmuch as on 30th June Mr. E. L. M. van Gelder retired from active participation in it. Mr. van Gelder, who has attained 70 years, had been actively engaged in the business almost since its foundation more than 46 years ago and he had been general manager of your company since its incorporation.

There is no doubt that to a large extent the progress of the business over the years was due to Mr. van Gelder's energy and drive, and it gives me great pleasure to record, on behalf of my colleagues on the board and the shareholders, sincere recognition of all that he has done for the business during his long period of service and our hope that he will enjoy many years of well-earned retirement.

Fortunately we shall still have the benefit of Mr. van Gelder's counsel and experience on the board.

The report and accounts were adopted. 5163

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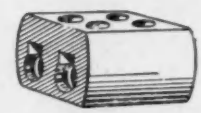

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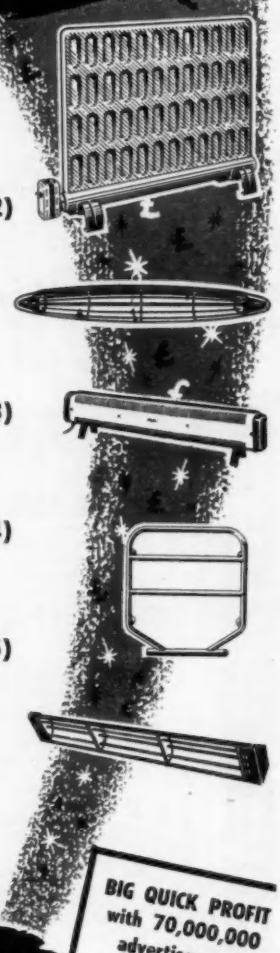

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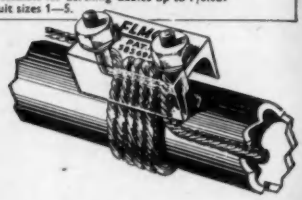

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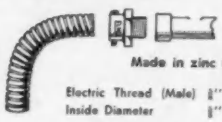

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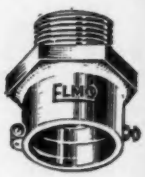

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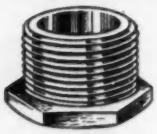

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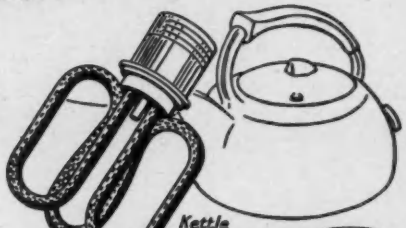
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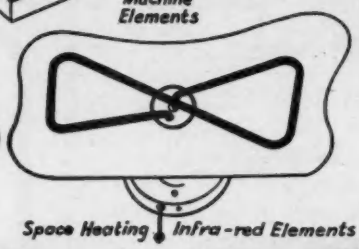
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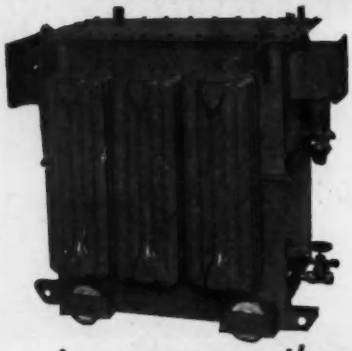

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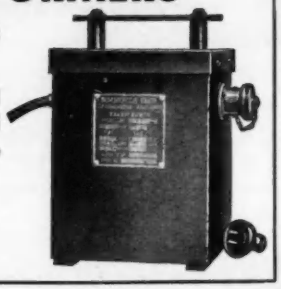

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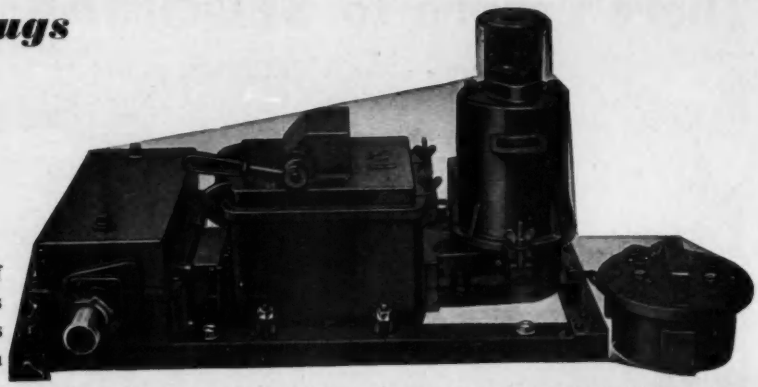

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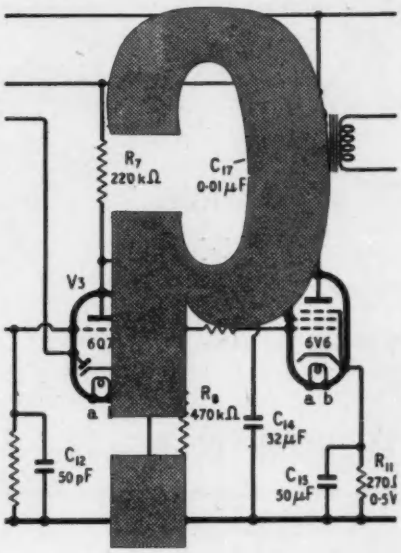

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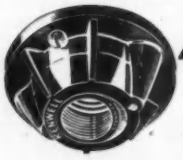

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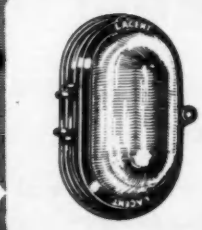

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